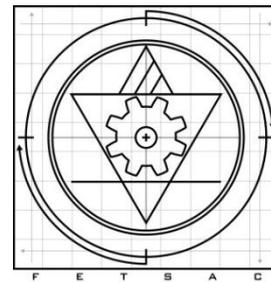


**FACULTY OF ENGINEERING
TECHNOLOGY
THE OPEN UNIVERSITY OF SRI LANKA**



Proceedings of 3rd Faculty of Engineering Technology
Student Academic Conference
25th January, 2017

ABSTRACTS

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Message of the Vice Chancellor

It gives me a great pleasure in sending this felicitation message to the Third Student Academic Conference of the Faculty of Engineering Technology of the Open University of Sri Lanka. As a former Dean of the Faculty I am very much delighted that the FETSAC has now become an annual calendar event of the University.



Over the years the quality of the undergraduate project work done by the students of the Faculty of Engineering Technology has improved immensely, which is evident by the number of awards our students are obtaining both in the local and overseas forums for their work.

The main objective of the student conference is to allow the students to disseminate the work they have done among fellow students and the industry personnel. It also provides the students training on how to prepare and present research findings to an audience, which I believe is an important trait any engineering / technology graduate should possess.

Further, the opportunity provided for the students to organize and conduct the conference on their own with able guidance from a few academics helps students to learn valuable co-curricular skills in organizing events, teamwork, communication skills etc. which will be of immense value in their professional career.

I take this opportunity to express my appreciation to the Organizing Committee of the Student Academic Conference 2016 and the staff who have contributed their time and effort to make this event a success.

I am confident that the Student Academic Conference 2016 would be an enriching and rewarding experience for all the presenters and participants.

Prof. S. A. Ariadurai
Vice Chancellor
January 25, 2017

Message of the Dean Faculty of Engineering Technology

It is with great pleasure I am writing this message to the Student Symposium of the Faculty of Engineering Technology. The Student Symposium was started as a part of Quality and Innovative Grant (QIG) under the HETC project three years ago. Due to its importance and success the Student Symposium has become an annual event of the Faculty even after the project. The Symposium is an important event for the students since it gives them an opportunity to present their final year projects not only to the examiners but also to outsiders. I am happy to note that some of the projects of the previous year were presented at both local and international conferences and have won prizes and medals.



This year the number of abstracts has increased significantly when compared with previous years. This is evidence that the Symposium is popular among the students. Even though some academics of the Faculty are behind this event the whole event is organised by the students of the Faculty. The events like this open opportunity to the students to improve their various skills such as managerial, communication, organising, etc.

The organising committee worked very hard during last few weeks to make this event a success. I must thank and appreciate all of them for their dedicated work. Finally, I congratulate the students who have presented their final year projects in the Symposium and hope this is only the first step of their success.

Wish you all the very best.

Dr. KAC Udayakumar
Dean,
Faculty of Engineering Technology,
January 25, 2017

Message of the Chairman Organizing Committee (Academic)

It is my greatest pleasure to write this message as the chairman of the Organizing Committee (Academic) for the third Student Academic Conference, FETSAC 2016. This year's theme of the event is "Creative Intelligence for Engineering Innovations". This is indeed an important area for engineering researchers. This conference gives a valuable opportunity to undergraduate students at OUSL to present their research to the university community as well as to the outside community. This event is mostly organized by the students of the Faculty of Engineering Technology. Their commitment, dedication, team work, and innovative minds had helped make this conference a success. Our students are required to carry forth their research activities beyond the academic levels to the industrial and commercial levels. This conference gives them a unique opportunity to enhance their skills in this area too.



I would like to express my appreciation to all the supervisors of the projects for encouraging their students to submit abstracts of their research to this conference, and for reviewing their abstracts. I wish to express my gratitude to all authors, participants, evaluation panels, and academic and non-academic staff of the Faculty of Engineering Technology. Without their commitment, this event would not have been a success.

On behalf of the Organizing Committee of the Faculty (Academic), I would like to thank Prof. S. A. Ariadurai, Vice Chancellor, and Dr. K. A. C. Udayakumar, Dean/Faculty of Engineering Technology for their kind and timely advices, help, and leadership, given to us as always. I would like to specifically thank Dr. (Mrs) Bandunee C.L. Athapattu and Eng. (Mrs) Hemali Pasqual for their continuous guidance towards the success of this event. I would like to mention and thank Mr. Sujeeva Jayawardene, Manager, Industry License Centre, for his special guidance towards engaging with the industry. I wish to thank Dr. N. S. Senanayake and Ms. Nadeera Meedin for conducting workshops on writing and presenting abstracts. I also take this opportunity to thank the staff of the OUSL Press, CETME, and the IT division, all of who had done an excellent job towards the success of this event despite their other commitments. Last but not least, I would like to thank all the members of my organizing committee for giving me their fullest commitment and help towards making this event a success.

Eng. D.I. Fernando
Chairman,
Organizing Committee (Academic) - FETSAC 2016
January 25, 2017

Message of the Chairman Organizing Committee (Students)

Welcome to the 3rd Annual Student Academic Conference, 2016. It is my pleasure to invite you to the FET (Faculty of Engineering Technology) Student Academic Conference 2016. This year, the conference is being held under the theme "*Creative intelligence for Engineering Innovations*".



We have lined up for you an exciting program that includes high-profile keynote speeches by Prof. Ajith De Alwis (Project Director, The Coordinating Secretariat for Science, Technology & Innovations), and President, Institution of Engineers Sri Lanka, Eng. Jayavilal Meegoda (Deputy General Manager, Ceylon Electricity Board) who is also our chief guest.

It is also my pleasure to introduce our FETSAC Award to the annual FETSAC event, and the FETSAC logo representing all departments of the Engineering Faculty at OUSL. We have chosen our top two final year projects to be awarded with FETSAC Awards and have invited their authors to the conference. Every year we award this special FETSAC award to those who brought proud to the University. I sincerely hope that you will enjoy this year's program, and take this opportunity to exchange new ideas, find new collaborations, and learn valuable life-long experiences from our senior members during the sessions.

I would like to take this opportunity to express special thanks to the Vice Chancellor, the Dean of the Faculty of Engineering Technology, FETSAC 2016 Organizing Committee (Academic), all the staff of the Faculty of Engineering Technology, Alumni Association of the Faculty of Engineering Technology, and the University who had given their valuable time and generous sponsorships to make this event a great success. Organizing an event like this requires considerable time and effort, and I would like to express my sincere gratitude to the organizing committee members who had devoted their time to prepare this wonderful and meaningful event. Without their endless dedication and hard work, I cannot imagine how we could have pulled this off.

H.M.K.K.M.B. Herath
Chairman,
Organizing Committee (Students) - FETSAC 2016
January 25, 2017

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Abstract No: AE301

DEVELOPMENT OF CATTLE FEED USING ORGANIC SOLID WASTE

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ABSTRACT

Waste products from textured vegetable protein (TVP) and rice noodles production cause disposal problems for food industries. This study was carried out to develop a cattle feed using “*deweni batha sludge*” – the waste from rice noodles production – and “*nutra waste*” from TVP production. *Deweni batha sludge* and *nutra waste* from a food industry were used as raw materials. These raw materials were converted in to powder. Crude protein, crude fiber, ash, ether extract, dry matter percent by mass, pH, brix value, and moisture content were determined in each powder. Based on the crude protein values of raw materials, the final product was developed by mixing *deweni batha sludge* and *nutra waste* in a ratio of 9:1. Palatability test of the developed feed was conducted to fulfill the daily crude protein requirement of a lactating cow. The cost of 1 kg of the developed feed was US \$ 0.66, whereas the cost of 1 kg of soy bean based feed in the market ranged between US \$1-10. The newly developed feed proved to be cost effective to the famers than other feed available in the market. Cattle feed developed using organic solid waste is a potential source to fulfill the daily crude protein requirement of cattle.

Keywords: Textured vegetable protein, Rice noodles, Cattle feed, Crude prote

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Abstract No: AE302

PERFORMANCE EVALUATION OF LOCALLY DEVELOPED CHILLI HYBRID LINES UNDER LOW COUNTRY INTERMEDIATE ZONE OF SRI LANKA

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ABSTRACT

Chilli (*Capsicum annum* L) is one of the major cash crop grown in Low country intermediate zone of Sri Lanka. However, the chilli production decline last few years and it leads to increase importation and most farmers adopt to grow exotic hybrid varieties. But those hybrids have been introduced by private sector without screening and most of them are not suitable for local conditions. In the light of this situation, present study was designed to identify high yielding local hybrid varieties suitable to low country intermediate zone. The experiment was conducted at Adaptive Research unit, Wariyapola during the Maha season in 2016 by using four hybrid lines received from Field Crop Research Unit, Gannoruwa. The experiment was laid out in a Randomized Complete Block Design with six treatments randomized in three replicates. Treatments were the six Chilli varieties, i.e. T1 - Chilli hybrid 1/2015, T2 - Chilli hybrid 2/2015, T3 - Chilli hybrid 3/2015, T4 - Chilli hybrid 4/2015, T5 - MI Green (OPV) and T6 – Vijaya (Exotic Hybrid Variety). Measurements were taken on vegetative and reproductive growth parameters as well as on pod characteristics. The data obtained were tabulated and analyzed subjected to the Analysis of Variance (ANOVA) procedure of Statistical Analysis System (SAS). Duncan's New Multiple Range Test (DNMRT) was performed to compare the differences among treatment means at $p=0.05$. Among different chilli hybrids tested, significantly higher yield was recorded from the hybrids 3/2015 (T3), 2/2015 (T2) and 1/2015 (T1). Vigorous and strong vegetative growth observed from the exotic Chilli hybrid call Vijaya (T6) but it gave poor yield as well as poor pod quality. The open pollinated variety (OPV), i.e. MI- Green showed the poorest performance on vegetative growth, reproductive growth as well as yield. However, all tested hybrid lines showed greater vegetative and reproductive growth while T5 and T6, i.e. Mi Green and Vijaya recorded poor yield and pod quality characters. However, these hybrid lines should evaluate further before recommend to grow farmer fields.

Keywords: Chilli hybrids, Vegetative growth, Reproductive growth, Yield, Low country intermediate zone

Abstract No: AE303

Supervisors

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EVALUATION OF GROWTH AND YIELD PARAMETERS OF SELECTED LINES OF YARD LONG BEAN (*Vigna unguiculata* sub spp. *sesquipedalis*) DURING OFF SEASONS IN MID COUNTRY WET ZONE

T.W.G.F.A Nijamudeen

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ABSTRACT

Yard Long Bean (*Vigna unguiculata* sub spp. *Sesquipedalis*) is a widely cultivated and consumed vegetable crop throughout the subtropical and tropical countries including Sri Lanka. The increase in temperature during the dry weather affects a wide range of physiological and phenological processes of the crop which associate with many biotic and abiotic stresses particularly in the off seasonal cultivation. Use of appropriate varieties is one of the strategies for dry seasonal cultivation. Hence this study aims to identify suitable Yard Long Bean varieties for dry seasonal cultivation in Mid Country Wet zone. The experiment was carried out by planting six locally developed promising varieties of yard long bean in 18 plots in 2 rows system at Horticultural crops Research and Development Institute, Gannoruwa during February to May 2016. Each plot consisted of 40 plants. The evaluation was carried out in a randomized complete block design (RCBD) with 3 replicates. The data collected were analyzed using the Minitab 17 statistical package. Recorded survival rate of all varieties was 100%. The highest seed germination rate was recorded by the variety 32-5. While the lowest seed germination percentage was recorded by the variety Hordi Red. Internodes length and the chlorophyll content among the varieties did not show significant differences. The leaf area showed a significant difference where Hordi red showed the highest leaf area while the lowest was recorded by the variety 32-5 and Hordi kola. As for the days to 1st flowering it was found that Hordi red had the fastest days to 1st flowering in 35.67 days and 32-5, Gannoruwahawari at about 36 days and 32-14, Hordi kola at about 37 days respectively. The longest time taken for the 1st flowering was taken by Gannoruwa A9 mae at 38.33 days. As for the 50% flowering it was found that 32-5 had the fastest flowering to 50% at 39 days. The next long rates were 32-14, Hordi kola and Gannoruwahawari which had flowering up to 50% in 39.67 days and Hordi red at 41.33 days respectively. Gannoruwa A9 mae took the longest time for flowering at 50 % about 44.67 days. As for the yields/plant, it was found that Hordi red gave the highest yield about 487.3g/plant. The next lower rate included Hordi kola, 32-14, Gannoruwa A9 mae, 32-5 yielding about 321.8, 293.5, 287.5, 273.5g /plant respectively. Gannoruwahawari yielding the least gave 161.1 g/plant. As for the total yield the Hordi red was recorded the highest (19012g/ha) while the lowest was recorded by the variety Gannoruwahawari (6252g/ha). Further the studies on customer preference revealed that the variety Hordi red, 32-5, Gannoruwa A9mae gave the highest preference and the move along experiment on post-harvest revealed the Hordi red can be preserved for more than the rest of the varieties (8days). Therefore the variety Hordi red and Hordi kola were most suitable for growing under the dry conditions due to its high growth and yield. And some of the local varieties such as 32-14 showed interesting characters which can be improved for the off seasonal cultivation.

Keywords: Yard long bean, off season, Sri Lanka

Keywords: Yard long bean, off season, Sri Lanka

Abstract No: AE304

EFFECT OF DIFFERENT CONCENTRATIONS OF NITROBENZENE ON BELL PEPPER (*Capsicum annum* L.) FLOWERING AND FRUIT SETTING

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ABSTRACT

Bell pepper (*Capsicum annuum L.*) is one of the most important vegetable crops grown extensively throughout the world especially in the temperate countries. Poor fruit-set was believed to be one of the major barriers to the tropical adaptation of bell pepper. Nitrobenzene is a combination of nitrogen and plant growth regulators, extracted from sea weeds that act as plant energizer, flowering stimulant and yield booster use in crop production. The objective of the present study was to examine the effect of various concentration of nitrobenzene on bell pepper yield. The study was conducted at a farmer poly tunnel located in Pilimathalawa (WU1). The experiment was laid out in a Completely Randomize Design with four treatments randomized in three replicates. The treatments were T₁ – Control (without Nitrobenzene), T₂ – Nitrobenzene 15%, T₃ – Nitrobenzene 20%, T₄ – Nitrobenzene 25%. Plants were established in drip-fertigated bags in the Poly tunnel and standard crop management practices were done throughout the study. Nitrobenzene was sprayed to the seedlings 40, 55, 80 and 105 days after planting. Albert solution, 6: 30: 30 fertilizer mixture 20: 20 fertilizer mixture and Ca(NO₃)₂ were used as recommended fertilizers. Measurements were taken on flowering and Fruit setting. The data obtained were tabulated and analyzed subjected to the Analysis of Variance (ANOVA) procedure of Statistical Analysis System (SAS). Duncan's New Multiple Range Test (DNMRT) was performed to compare the differences among treatment means at p=0.05. The highest number of fruits and flowers/plant was observed in T₃ and T₄, i.e. 20% and 25% Nitrobenzene applied treatments. On the other hand the lowest number of flowers as well as fruits were recorded from T₂ (15% nitrobenzene) and T₁ (control of the experiment). Among different treatments tested, 25% nitrobenzene applied plants showed superior results in contrast to other nitrobenzene levels with enhancing flowering as well as fruit setting.

Keywords: Bell pepper, Nitrobenzene concentrations, Flowering, Fruit setting, Poly tunnel

Abstract No: AE305

FIELD SCREENING OF RICE (*ORYZA SATIVA L.*) GERMPLASM FOR BROWN SPOT (*BIPOLARIS ORYZAE*) AND SHEATH MITE (*STENEOTARSONEMUS SPINKI*) DAMAGE

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ABSTRACT

Brown spot, caused by *Bipolaris oryzae*, is one of the most important diseases of rice in Sri Lanka. The disease is responsible for significant economic losses as it results in loss of both grain quality and yield. Rice sheath mite, *Steneotarsonemus spinki* infests flag leaf sheath and causes brown discolouration, also its infestation on panicle causes chaffy grains and discolouration of filled or ill-filled grains. The field trial experiment was conducted at the Rice Research and Development station, Labuduwa during May to October 2016 with the objectives of to determine the reaction of traditional and improved rice germplasm to brown spot disease and sheath mite damage and to identify the correlation of morphological characteristics with brown spot disease and sheath mite damage. 84 Rice germplasm were screened in randomized complete block design with two replicates. Data were recorded at Booting, Milking and Maturity stages. Selected morphological data were collected at harvesting stage. Brown spot disease scoring was done by using standard disease rating scale of IRRI (2002). The severity rating scale ranged from 1 (highly resistant) to 9 (highly susceptible). The mite population per sheath was counted by using microscope. Among the 84 rice varieties, 31 varieties were highly Resistant, 41 varieties were Resistant and 12 varieties were moderately Resistant. The screening revealed that in maturity stage brown spot was higher than booting and milking stage. The result of the experiment revealed that the maximum sheath mite populations were recorded in milking stage. 18 varieties were highly resistant and 12 varieties were highly susceptible to sheath mite. Most of traditional varieties were highly resistance to both diseases than improved varieties. Some morphological characteristics had some indirect influence on expression of brown spot and sheath mite resistance genes. Rain fall, Temperature and Relative humidity was influence the infection of the pathogen and development of the diseases.

Keywords: Brown Spot, Resistant, Sheath mite, Rice germplasm, Morphological

Abstract No: AE306

EFFECT OF PLANT GROWTH REGULATORS (PGR) ON FRUIT SET AND PREMATURE FRUIT DROP IN RAMBUTAN (*NEPHELIUM LAPPACEUM* L)

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ABSTRACT

The experiment was conducted to identify the best Plant Growth Regulators (PGR) on fruit set and premature fruit drop and fruit quality in rambutan at the Fruit Crop Research and Development Station at Gannoruwa, Peradeniya. Eight treatments were used in Randomized Complete Block Design (RCBD) with three replicates. Treatments were Borax (T1), K fertilizer (T2), Gibberellins (T3), Naphthalene Acetic Acid (T4), Gibberellins + K fertilizer (T5), Naphthalene Acetic Acid + K fertilizer (T6), Naphthalene Acetic Acid + Borax (T7), Chemical/PGR free branch as treatment (T8). The highest average premature fruit drop at 6 weeks after treatment was recorded in GA₃ application treatment (54.45). The lowest premature fruit drop (8.55) was shown by the treatment 4 (NAA). Highest fruit weight (37.57g) was observed in treatment 2 (K⁺) and lowest fruit weight (5.52) was recorded by treatment 6 (NAA + K⁺). Highest flesh weight (13.69g) was observed in treatment 8 (control) and the next highest was shown by treatment 5 (GA₃ + K⁺) whereas the lowest flesh weight (6.18g) was recorded by the treatment 6 (NAA). Treatment 3 (GA₃) recorded highest flesh thickness (0.62mm) and the lowest (0.32mm) was shown by treatment 6. Highest seed length (1.87cm) was shown in treatment 8 (control) and the lowest seed length was recorded by the treatment 6 (NAA). Average seed width was ranged between 0.39 cm and 1.22 cm. Highest seed width (1.22cm) was observed in treatment 8 (control). The lowest seed width (0.39cm) was recorded by the treatment 6 (NAA). However treatment 8 (control) recorded highest peeled fruit length, while the lowest was shown by treatment 6. When considered the average brix value at fully ripen fruits were range between 7.45 and 13.07. Highest average brix (13.07) was observed in treatment 5 (GA₃+K⁺) and lowest brix was recorded by treatment 6 (NAA + K⁺). NAA reduced the premature fruit drop and increased fruit weight significantly than the other growth regulators. GA₃ applied with K⁺ increased the sweetness of fruits.

Keywords: Rambutan, Plant Growth Regulators, fruit set, premature fruit drop

Abstract No: AE307

INFESTATIONS OF ROOT-KNOT NEMATODES, ASSOCIATED WITH SELECTED VEGETABLE CROPS IN WENDARUWA AGRARIAN SERVICE DIVISION IN KANDY DISTRICT

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ABSTRACT

The root knot nematode, *Meloidogynespp* has been referred as one of the most widespread nematode genera and damage results in vital crop losses with poor growth, a decline in yield, quality of the produce and also have the ability to break the resistant of host plant and make it more susceptible to other pathogen. Main Objective of this research is to conduct an initial level investigation on farmers knowledge on disease problems associated with respect to root knot nematode on vegetable crop cultivation in Wendaruwa Agrarian Service Division. A survey was conducted with emphasis on the identification of *Meloidogynespp* to provide a basic information for effective control against nematodes. Seven vegetable crops, bitter-gourd (*Momordicacharantiai*), brinjal(*Solanummelongena*), chili (*Capsicum annum*), okra (*Abelmoschusesculentusi*), cabbage (*Brassica oleracea*), tomato(*Solanumlycopersicum*) and snake-gourd (*Trichosanthes cucumerina. L*) at six vegetable growing regions in Wendaruwa Agrarian Service Division, Kandy District in Sri Lanka. 5-10 individual root samples of each mature vegetable crop per location were assessed for nematode symptoms and damage. *Meloidogyne species* were identified based on the perennial pattern of mature females. Results revealed *Meloidogyne* infestations were detected only on bitter-gourd, tomato and okra. Three *Meloidogyne* species namely *M. incognita*, *M. javanica* and *M. hapla*, were identified. However, species composition varied with respect to vegetable crops and location. *Meloidogyne incognita* was detected in all the infested vegetable crops. All three *Meloidogyne* species were found together as mixed populations on okra at Welapahala. At Kandekumbura area *Meloidogynenematodes* were not detected associated with any of the vegetable crops checked.

Keywords: Meloidogynespp, Female perennial pattern

Abstract No: AE308

EVALUATION OF CHILLI (*Capsicum annum L.*) VARIETIES ON MORPHOLOGICAL AND YIELD PERFORMANCE FOR PRODUCTIVITY IN JAFFNA DISTRICT OF SRI LANKA

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ABSTRACT

The study was carried out at the District Agriculture Training Center, Thirunelvely, Jaffna, Sri Lanka during May to October to check the adaptability of new chilli hybrids under local condition. Chilli (*Capsicum annum*) is one of the most important cash crop grown in Sri Lanka. It has become an essential ingredient in Sri Lankan meals. Chilli is extensively grown for dry chilli production, but part of the crop is harvested as green pods. Generally Jaffna farmers get low yield (8- 10 ton / ha) from chilli cultivation, mainly due to pest and diseases incidence. The treatments consisted of four varieties :KA2(T1), MI – green(T2), MI 1 hybrid(T3) and cimi F₁hybrid(T4) in randomized block design with three replicates. It showed wide differences in their genotypic constituents reflected by morphological status. Major characters of growth and yield such as plant height, days to first flower bud initiation, number of fruits/plant, number of fruits/plant, individual fruit weight, fruit length, fruit diameter, and yield were influenced by cultivars. Plant height and canopy width were statistically significant among varieties. Plant height and canopy width were significantly differs with different varieties. Pod weight and pod number / plant were highest at 2nd harvesting. In this experiment, the difference in chilli fruit length was significantly different among the varieties. Peak production was obtained from the second harvesting. The difference in yield of chilli was statistically significant among varieties. Higher yield was obtained from MI 1 hybrid at 2nd harvesting (11.37 ton / ha). Therefore, tested variety is more suitable for chilli cultivation to obtain optimum green chilli production.

Keywords: Hybrids, Cultivar agronomic character, evaluation, RCBD

Abstract No: AE309

EFFECTS OF MACRO AND MICRONUTRIENT SUPPLEMENTATIONS ON OVERALL GROWTH & FLOWERING PERFORMANCES OF CHRYSANTHEMUM (*Chrysanthemum morifolium Ramat*) CUTTINGS UNDER GREEN HOUSE CONDITIONS

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ABSTRACT

Chrysanthemum or mums (*Chrysanthemum morifolium* Ramat.) belongs to family Asteraceae play vital role in ornamental horticulture and it is one of the highly exploited flower crops. In many countries, including the United States and Japan, it is considered as the number one crop. Chrysanthemum is a heavy feeder of nutrient and responds well with fertilizer supplementations. Chrysanthemum consider as one of the important commercial flower crops of Sri Lanka, due to its multifarious benefits as a potted flower, cut flower and a bedding plant. In Sri Lanka flower yield level are low than worlds average yield. Improper nutrient management can be one major reason for lower yields in floricultural crops. Hence there is a need to standardize the optimum use of nutrients particularly the proper nutrient management for improving the overall growth and flower yields. Hence looking to the above facts, the present investigation entitled “Effects of Macro and Micronutrient Supplementations on Overall growth & Flowering Performances of Chrysanthemum (*Chrysanthemum morifolium* Ramat.) Cuttings under Green House Conditions” was carried out with the objective of comparing the effectivity of commercially available popular organic and inorganic nutrient packages on Chrysanthemum growth, yield, yield quality, pest and disease tolerance which affect marketable yield. Experiment was carried out to study the effect of organic manures and inorganic fertilizers on growth, flower production of Chrysanthemum. Experiment was laid out in complete randomized design (CRD) with three replications. The treatments in each replication were, T₁ – Royal Botanical Garden (RBG) Recommendation for Chrysanthemum, T₂ – KRISTA K PLUS, T₃ – Albert solution, T₄ – Baur flower fertilizer, T₅ – Yaramila flower fertilizer, T₆ – Vermicompost flower fertilizer and T₇ – Uni crop flower fertilizer. The study revealed that, supplementation of essential macro and micro nutrients can significantly influence plant height, number of branches per plant, plant spread, dry matter accumulation, flower quality parameters and reproductive parameters of Chrysanthemum. Application of secondary and micronutrients other than the macronutrients can be positively influence the overall growth and flowering performances of Chrysanthemum.

Keywords: Micronutrient, Chrysanthemum, Vermicompost, Organic fertilizer

Abstract No: AE310

A STUDY ON UTILIZATION OF PESTICIDE IN PADDY CULTIVATION AT COASTAL AREA OF AMPARA DISTRICT

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ABSTRACT

Rice is the stable food in Sri Lanka and most of the people are cultivating paddy as their major income resource. Especially Ampara district is supplying 1/5th of rice production to this country in its total paddy production. To get the higher yield the farmers has been adopted to utilize the high amount of pesticides than the Department of Agriculture recommendations due to the attraction of business promotional propogandas which are successfully made out through the mass Medias. The poor farmers are adversely affected to this and it is a very high task to release them from this pesticide mafia. The Integrated Pest Management is the one and only source to reduce the usage of pesticide and it can be an ideal remedy for protecting our farmers from the hazards. Due to the high use of pesticide they never obtain high rate of profit when we compare to the farmers who are using the pesticide very rarely or limitedly. Because of the high cost to the pesticides leads them to increase their cost of cultivation rather than other farmers. Therefore the both group of farmers obtaining the net profit from the paddy cultivation is not much vary. Over utilization of the pesticides is not a recommended way to overcome the field problems and the DOA is implementing a Yaya2 program to obtain high yield with low cost of cultivation especially less use of agrochemicals. The Sri Lankan government taking several necessary actions to regulates the imports and usages of agrochemicals.

Keywords: Pesticides, Integrated Pest Management, Paddy, Yield

Abstract No: AE311

IMPACTS OF NUTRIENT SUPPLEMENTATIONS ON GROWTH AND YIELD OF JASMINUM

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ABSTRACT

An experiment was conducted to find out the effects of standard nutrition packages which is available in market on growth and yield of Jasminum (*Jasminum multiflorum* Roth) with the objective of improving growth and flowering performances of *Jasminum multiflorum* plants. The experiment was laid out in a Complete Randomized Design with seven treatments and each treatment was replicated thrice. Other than the Royal botanical garden (Perediniya Sri Lanka recommendation, Vermiwash, Unicrop liquid fertilizer for leafy vegetables, Crop master and Compost were used as treatments. The study confirmed that nutrients can limit and enhance plant growth and affects flower yield; T1 only macro nutrient containing pots showed significantly lower performances in terms vegetative and reproductive parameters compared to all other treatments this may be due to lack of micro nutrients in soil. Plants amended with treatments contain mineral and or organic macro secondary and micronutrient perform well. Study revealed that, application of secondary and micro nutrients other than the N, P, K, can influence growth and yield performances of Jasmin.

Keywords: Jasmine, Organic fertilizer, Micronutrients

Abstract No: AE312

A STUDY ON FARMING PRACTICES OF PADDY CULTIVATION IN POTENTIAL REGIONS OF MAHAGIRILLA AGRARIAN SERVICES DIVISION FACTORING THE WATER MANAGEMENT AND FERTILIZING

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ABSTRACT

Supplying enough food for the ever growing population has become one of the big challenge facing Sri Lanka today. Considering the paddy statistics throughout 10 years in *Maha* and *yala* seasons, though Anuradhapura, Polonnaruwa, Ampara maintain higher average yield than national average yield, Kurunegala has less average yield than national average yield which should be taken in to consideration because this indicates that there is a clear difference between potential yield and the farmers' yield in unit land area of Kurunegala district. It is known that management of water and fertilizer is important to reduce the above yield gap or to increase yield per unit area. Therefore this study was broadly designed to investigate farmer level problems contributing to low productivity of paddy cultivation with special reference to water management and fertilizing. The specific focus of the study was to examine the prevailing cultural practices, to study the Socio-Economic conditions of the paddy farmers, and to identify to which extent the farmers have adapted new technological practices to overcome prevailing problems in Mahagirilla Agrarian Services division. 300 farmers who were engaged in paddy farming from 16 Grama Niladhari divisions were selected using random sampling method and 100 from major schemes, 100 from minor schemes and 100 from rain fed irrigation system were selected. The study revealed that the yield is positively correlated with method of planting, method of fertilizer application, duration of land preparation done, way of water supplying etc. The majority of farmers are a risk averse cluster who hesitate to adapted new technological practices to overcome prevailing problems. It could be recommended to organize awareness campaigns, build the confidence of farmers through activity oriented and result oriented trials, create a competitive work environment throughout the paddy farming areas, promote paddy cultivation among young generation, and consistently providing subsidiaries through the government and non-government organizations to reduce the yield gap.

Keywords: Cultural practices, Water management, Fertilizing

Abstract No: AE313

INFLUENCES OF MACRO AND MICRONUTRIENTS ON GROWTH AND FLOWERING BEHAVIOR OF *Dendrobium bigibbum*

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ABSTRACT

Dendrobium bigibbum is one of the most commonly cultivated *Dendrobium* species. *Dendrobium* species are third largest genus (Orchidaceae) is the most 'in demand' cut flower in the export and local market due to its long lasting vivid and variable flower colouration. The major problems being faced in *Dendrobium* cultivation are flower bud drop, short stalk length and high disease and pest incidence. The production of quality flower is the major obstacle faced by local growers in Sri Lanka. Among the agro-techniques, nutrition is one of the main factor which governs the yield and yield quality of dendrobiums production. However, no research has been carried out to improve the floricultural yield and yield quality of *Dendrobium* plant flower using non- hazardous methods and still there is no fertilizer recommendation by Department of Agriculture for highly demanded *D.bigibbum* (Two-humped *Dendrobium*). The experiment was carried out to study the influences of macro and micronutrients on growth and flowering behavior of *dendrobium bigibbum*. The experiment was conducted in the "Floriculture Unit" of BMICH, Garden Division, during the period from March 2016 to September 2016 and was designed as a completely randomized design (CRD) with six treatments and three replicates. In this experiment six treatments were used as follows T₁ – RBG (Royal Botanical Garden) Recommendation, T₂ – Albert solution, T₃ – Vermicompost, T₄ – Chitosan + Uni-crop fertilizer, T₅- Orchid bloom+ Crop master and T₆- Nitro plus+ Crop master. The study revealed that, supplementation of essential macro and micro nutrients can significantly influence growth and flowering behavior of *Dendrobium bigibbum*. In case of combine application of Chitosan + Uni- crop fertilizer significantly improved all the vegetative, yield and yield quality characters than all other treatments. This could be due to supplementations of macro and micro nutrients with Chitosan can affect the plant metabolic activities positively. The experiment revealed and highlighted the requirements of essential macro, secondary and micro nutrient fertilizer packages for *Dendrobium bigibbum* cultivation.

Keywords: *Dendrobium*, Micronutrients, Organic fertilizer, Chitosan

Abstract No: AE314

EFFECT OF DIFFERENT TYPES OF CHARRED BIOMASS ON YIELD OF ONION (*Allium cepa*) AND SOIL PROPERTIES OF CALCIC RED YELLOW LATASOL

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ABSTRACT

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An experiment was conducted to find the response of *Allium cepa* (onion) for three types of charred biomass namely coconut char (CC), palmyrah char (PC), and paddy husk char (PHC) in combination with organic and inorganic fertilizers and to find the effect of these charred biomass on important soil properties. The field experiment was carried out at the Regional Agriculture Research Station, Thirunelvely. Randomized Complete Block design was used with three blocks and eight treatments. The treatments were, department recommended fertilizer (DRF), farmers practice fertilizer (FPF) and each three types of charred biomass with either DRF or FPF. The recorded data were analyzed. Application of charred biomass with fertilizer has improved onion yield and available nutrients (P and K) compared to fertilizer application alone. About 56.82% yield increase was observed in T3 (DRF+PHC) respectively compared to T4 (DRF). However, T1 (DRF+CC) and T2 (DRF+PC) did not show significant difference in yield compared to T4 (DRF). Similarly, about 13.96% and 50.83% increase was found in T6 (FPF + PC) and T7 (FPF + PHC) respectively compared to T8 (FPF). However, T5 (FPF+CC) did not show significant difference in yield compared to T8 (FPF). PC has improved important soil properties followed by CC and PHC when apply with DRF. In T2 (DRF + PC), availability of P and K were increased by 27.95%, and 47.97% respectively compared to T4 (DRF). Likewise PHC has improved important soil properties followed by PC and CC when apply with FPF. In T7 (FPF + PHC), availability of P and K were increased by 24.79%, and 30.31% respectively compared to T8 (FPF). However, T1 (DRF + CC) has increased P and K availability by 1.85% and 16.93% respectively compared to T4 (DRF). Similarly, in T5 (FPF + CC) above same properties increased by 4.14% and 9.05% respectively compared to T8 (FPF). PC has increased the P and K availability when apply with FPF also. About 20.12% and 11.34% increase of available P and K respectively were recorded in T6 (FPF + PC) compared to T8 (FPF). Soil pH in treatments related to FPF and increased soil pH in treatments related to DRF was recorded even in same charred biomass applied treatments. Soil Organic matter content was increased by the application of all three types of charred biochar compared to control. Therefore PC has higher potential to improve soil properties and PHC has increased yield when apply with DRF and paddy husk char performs best when applied with farmer practice fertilizer. However, coconut char and palm char has the potential to increase yield and improve soil properties with both DRF and FPF.

Keywords: Charred Biomass, Onion, Soil properties

Abstract No: CE301

PHYTOREMEDIATION TO TREAT REVERSE OSMOSIS CONCENTRATE AND REUSE OF RO CONCENTRATE FOR BURNT CLAY BRICK PRODUCTION

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ABSTRACT

The Reverse Osmosis (RO) water purification systems about 50-70% of raw water with higher concentrations of ions release from RO systems with no beneficial use. Such practice will end up with long term environmental impacts. This research was focused to investigate two remedial measures for concentrated contaminants of RO rejected water. One is through phytoremediation process using construction wetlands, and the other one is brick manufacturing process. The field experiments were carried out focusing the Sangilikanadarawa at Medawachchiya community based RO water supply unit.

Two types of constructed wetlands (CW): surface and subsurface water CW were established and tested to measure the removal efficiency of RO concentrates through phytoremediation and media materials. Native soil, Calicut tile and biochar were used with proportions of 80, 17.5 and 2.5% by weight respectively. *Vertiver Grass* and *Scirpus Grossus* were carefully selected for the sub surface wetland while Water Lettuce and Water Hyacinth were as free water surface CW. Both CWs were fed with uniform flow of RO concentrate and water quality parameters were tested periodically. The results showed that Total Dissolved Solids, Hardness, Total Alkalinity and Fluoride were reduced significantly. Therefore the invented bio-geo constructed wetland system is an economical and effective option for reducing high concentrations of RO rejected water before discharging into the inland waters.

Brick manufacturing process was implemented using two different water samples; well water and RO concentrate. Collected 24 numbers of bricks in each sample and carried out physical and laboratory tests for the both samples and compared. Based on the results, it can be concluded that Reverse Osmosis concentrate can use for industrial purposes such as brick manufacturing process in this area.

Keywords: Reverse Osmosis, concentrates, constructed wetlands

Abstract No: CE302

COMPARATIVE STUDY OF STEEL-CONCRETE COMPOSITE STRUCTURES WITH TRADITIONAL REINFORCED CONCRETE STRUCTURES IN SRI LANKA

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ABSTRACT

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Steel-concrete composite construction has gained wide acceptance worldwide as an alternative to pure steel and pure concrete construction. The use of steel in construction industry is comparatively low in Sri Lanka compared to reinforced concrete construction. The present work deals with the comparative study of steel-concrete composite versus conventional reinforced concrete building in Sri Lanka. Multi-storey commercial building (G+2 storey) is analysed and designed by manual method and using numerical tools according to British Standard code of practice. Studies were conducted theoretically and compared the results of both types of structures

Design and cost estimation is carried out to compare between reinforced concrete and composite structure for economical solution. It has been observed that the conventional reinforced concrete building is economical than steel-concrete composite building. Decision matrix was constructed with the data gathered from questionnaire survey. It has been found that steel-concrete composite building is a better option when mainly considering the constructions time. As well as when considering the overall performance such as including the time, cost, quality, reliability, functional performance, aesthetic appearance and environment friendly both types of structures are mostly having same capability for low rise commercial building in Sri Lanka.

Keyword: Steel-concrete composite, Reinforced concrete, Decision matrix, Numerical tools, Low rise building

Abstract No: CE303

STRUCTURAL ASSESSMENT OF RECENT BRIDGE DAMAGES AND FAILURES IN SRI LANKA

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Condition assessment of bridges and maintenance strategy of Sri Lanka is based on visual inspection. However, visual inspection of bridges tends to be labour intensive, personal bias, expensive and inconsistent. Further priority of resource allocation on bridge maintenance is also not properly addressed in Sri Lanka. These reasons have led a number of sudden bridge failures such as Paragastota Bridge (1999), Rakwana Bridge (2014) and Kappitigala Bridge (2015). Studying the failures of the past can be useful in mitigating the incidence and potential of future failures. This project was carried out to find failure reasons and modes of failed bridges and to assess current conditions of the damaged bridges and give recommendations to prevent bridge failures. Some of the recent bridge failures which happened in Sri Lanka were selected for failure analysis. These bridges were failed as a result of overloading due to heavy loaded tipper or tippers. Finite Element (FE) analysis was carried out using the STAAD.Pro and SAP 2000 software, where different FE models were developed for each bridge. Manual calculations also used for analysis. Laboratory experiments such as Tensile test, Hardness test and Microscopic test were carried out to identify material and material properties of each bridge. Fatigue test was also carried out for Rakwana Bridge. In this study the critical failure modes were identified for each bridge. The results showed that Paragastota Bridge was failed in tension by exceeding the elastic capacity, Rakwana Bridge was failed due to slip while Kappitigala Bridge was failed due to compression failure in top chord. Finite Element analysis was also carried out for some of damaged bridges to give load limitations for each bridge. Analyses were done with loaded tippers (around 25-35 tons) moving on the each bridge and got the safe load limit without any failure of the member of the bridges. By visual inspection of bridges some heavily corroded and deteriorated members, cracked members, missed members were identified. Recommendations were made such as decayed members and missed members shall be replaced by good ones, cracked members shall be welded, corroded members shall be painted etc. to protect service life of damaged bridges.

Keywords: Bridge Failures, Finite Element (FE) Analysis, Laboratory Testing, Failure Modes, Load Limitations

Abstract No: CE304

AN EXPERIMENTAL AND ANALYTICAL STUDY OF THE CRITICAL PROPERTIES OF COMPRESSED STABILIZED EARTH BLOCK

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ABSTRACT

Compressed Stabilized Earth Blocks are used as an alternative building material for burnt clay bricks and cement blocks. This is an appropriate and cost-effective wall construction material as most of the generally available gravel soil can be used for manufacturing of these blocks. Therefore, the study was carried out to obtain in-depth information concerning technical and practical issues of Compressed Stabilized Earth Blocks (CSEB) considering the observations from industrial visits at topmost manufacturing factory in Sri Lanka. Physical properties of



compressed stabilized earth block and wall defects were tested and analyzed to identify the optimum solutions to avoid the industrial issues.

The soil selection was done according to the SLS 1382 PART 3, 4.2.2 and samples were extracted from Western Province (Avisawella and Homagama) in Sri Lanka. Laboratory assessments of sieve analysis test, hydrometer test, standard proctor compaction test, pH test and Atterberg limit test were conducted for these two soils samples to recognize the properties of raw material and conformed to standard requirements. Thereafter, various soils: cement mix proportions (w/w) of 4%, 6%, 8%, 10% and 12% were tested for maximum dry density and optimum moisture content according to British standard. According to an analysis of dry density vs. material cost, 6% & 8% cement contents are found to be precise mix proportion for block making. The productions of CSEB's at manufacturing plant were carried out for the selected cement mix proportions (6% & 8%) according to SLS 1382 specifications prescribed method. Then the blocks were tested for compressive strength, dimensions, tensile strength and pitting depth. It was found that all the blocks tested were confirmed with the SLS standards after 7 days period of curing. The reason of structural wall cracks was identified through the development of finite-element model by using SAP 2000 software. It was observed that the higher stress values, positive and negative stress boundaries appears at mid zone of the larger wall panels in vertical direction. Therefore, narrow walls are recommended to avoid the vertical crack propagations.

Keywords: Compressed stabilized earth block, Maximum dry density, Finite-element analysis.

Abstract No: CE305

ENGINEERING INTERVENTION REMEDY TO IMPROVE WATER QUALITY OF KIRULAPONE CANAL FOR THE FACILITATION OF PASSENGER BOAT SERVICE

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ABSTRACT

Kirulapone canal of Diyawanna Oya urban canal network in Colombo which could be used for boat transportation is currently threatened by nutrient enrichment due to the wastewater disposal as a result of rapid urbanization. Hence this research was aimed on assessment of the pollution status, behaviour of canal bed and stratification at outfall of the canal for proposing appropriate engineering remedy to improve water quality of urban water and to overcome challenges on

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passenger boat service. The water quality survey were conducted while variation of canal bed level was plotted by “Surfer” software to discuss on the minimum depth required by boats. Horizontal subsurface constructed wetland system was recognized as the mitigation method for urban water pollution and flood risk was analysed using “HEC-RAS”.

The canal water quality (WQ) was critical in dry season and low DO, high PO_4^{-3} , BOD & TDS were found as the main problematic parameters when compared with ambient WQ parameters of inland water bodies. Though there was a salinity intrusion at downstream no variation of water quality was observed in the vertical profile of canal depth. Hence no water stratification was observed during the study period. According to the analysis the canal bed level increases with time and canal water depth was found to be maintained at least about 1m as the requirement of boat transportation. Horizontal subsurface constructed wetland system with the combination of biochar as a nutrient adsorbent was proposed to improve the water quality of the stream. Flood mappings obtained by HEC-RAS modelling showed that no flood inundation risk due to construction of engineered wetland. Native aquatic plants were proposed to optimize the purification process as a step towards the sustainable environment management.

Keywords: Urban water, Stratification, Bathymetry, Canal Transportation

Abstract No: CE306

ASSESSMENT OF FLY ASH BASED GEOPOLYMER CONCRETE PAVING BLOCKS FOR SRI LANKAN ROADS

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ABSTRACT

Due to rapid infrastructure development taking place nowadays, Portland cement (PC) concrete is the most popular and widely used building materials, due to its availability of the raw materials over the world, its ease for preparing and fabricating in all sorts of conceivable shapes. About 1.5 tonnes of raw materials is needed in the production of every tonne of Portland cement, at the same time about one tonne of carbon dioxide (CO_2) is released into the environment during this production.

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The coal fired thermal power plants generate solid waste in the form of fly ash and pond ash. Disposal of these wastes is a major engineering challenges. About 1.5 tonnes of raw materials is needed in the production of every tonne of Portland cement, at the same time about one tonne of carbon dioxide (CO₂) is released into the environment during this production. Therefore research attempt to see whether this solid waste can be used in geopolymers, so that it will mitigate the adverse effects on the environment due to disposal while reducing the carbon footprint. In this research to geopolymer concrete paving blocks were made from low calcium fly ash activated by alkaline solutions (NaOH or KOH) to liberate Si and Al with an additional source of silica to assess whether could satisfactorily be used in Sri Lankan roads satisfying the SLS standard requirements.

Geopolymer concrete blocks with concentration of NaOH of 12M and 16M was prepared for three different strength classes, namely 30MPa,40MPa,50MPa .One set of series was cured in 80°C for 48hrs and one set of series was cured in ambient temperature. Laboratory experiments were to determine compressive strength, Slip/Skid resistance and water Absorption. The results was compared with SLS 1425 part 1 & 2.

GPC paving blocks for all strength classes which is cured in 80 °C is found to be satisfy all SLS specifications while Compressive strength of GPC paving blocks cured in ambient temperature is found to be less than the design strength, but GPC paving blocks cured in ambient temperature is found to be satisfy SLS specifications.

Keywords: Geopolymer Concrete paving blocks (GPC paving blocks), Fly ash, Compressive Strength, Slip/Skid resistance, water Absorption

Abstract No: CE307

ESTIMATION OF GREY WATER FOOT PRINT AND DEVELOPMENT OF WATER QUALITY MODEL FOR THE KELANI RIVER SUB-BASIN

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ABSTRACT

Water quality of inland water resources is one of the main environmental facts due to rapid population, industrialization and urbanization. The present study focuses on estimating the Grey Water Footprint of the KaluEla sub basin which is the secondly highest polluted sub basin of the Kelaniriver and develops the water quality model.

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The Grey Water Footprint (GWF) is selected as an assessing tool to present pollution rate of a river basin which is estimated by using concentration of pollutants with run off the water body. The total basin was separated into five sub basins and flow rate of sub basins were evaluated by using the Hydrological Modeling System (HEC-HMS) while thirteen water quality parameters were selected for estimating the highest concentration of pollutants. Soil Water Assessment Tool (SWAT) was taken as water quality model to evaluate the water quality of KaluEla basin. Maximum GWF was recorded by sub basin 4 as 9.78m³/s. Resulted GWF reveals that the need of fresh water is 9.78m³/s to assimilate the pollutant load in the KaluEla.

This convinces that the KaluEla basin is in the critical condition at present due to deterioration of water quality. If the present pollution status is continued, it creates unpleasant impacts on human health and affects the socio-economic development due to growing demand on the fresh water resources. Hence, GWF is recommended as an assessing tool on pollution rate estimation in order to control pollution load of the KaluEla basin subsequently Kelani river basin to fulfil the national necessity.

Keywords: Grey Water Footprint, KaluEla sub basin, Pollutant Load, HEC-HMS, SWAT

Abstract No: CE308

INVESTIGATION ON FLAT SLABS IN SRI LANKA

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ABSTRACT

High demand for upstairs buildings among the world leads to strong demand for Flat Slabs. Traditional practice of constructing the slab on the beams and the support the beams on the columns, which known as “Conventional Slab Beam”. This reduced the clear height. Changing the traditional concept by resting slab directly on the columns, without the support of the visible beams is known as the concept of “Flat Slabs”.

Identify the prominent influencing factors among Durability, Efficiency, Workability, Appearance, Attitude & Structural Strength factors affecting on usage of Flat Slabs, Provide a comparison report on design aspects, cost involved and self-weight comparison in ordinary Slab beam and Flat Slab under same dimensions. And as sub objectives study the opinions of future

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of the Flat Slab in Sri Lanka, study the recommendations to improve the Flat Slab usage. Sample Population of 50 on medium rise (2-10 floors) construction sites in Colombo area were selected under selective sampling technique. It represents 40% Designers, 20% Architects, 20% Contractors, and 20% Clients. Hypothesis are established based on positive relationship between Durability, Efficiency, Workability, Appearance, and Attitude & Structural Strength to usage of flat slabs.

Descriptive and Inferential statistics method are used to analyze. Software designs, BOQ Calculations, AUTO CAD, Etabs, SAP2000 assist the design and research study. Appearance has the strongest relationship. Workability and attitude pay considerable positive feedback of the usage of Flat Slabs. Durability affects strongly negative with the usage, hence it cannot withstand the lateral forces. BOQ values of Flat Slab gives the figures of +26.8% increase of cost per 1 m² of area to finish the structure for 6000mm span. Flat slab has +25% higher self-weight. Results of the opinions of future of the Flat Slab in Sri Lanka indicating that Flat Slabs are good enough but near columns it may critical, as a solution may create the flat slabs with supported to shear walls. As recommendations to improve the Flat Slab are Introduce wall Slab replacing columns, Introduce tendons to slab.

Keywords: Conventions Slab Beam, Flat Slab, Esthetic Appearance, Workability, Durability.

Abstract No: EE301

REPLACEMENT OF BARE CONDUCTORS WITH AERIAL BUNDLE CONDUCTORS IN DISTRIBUTION SYSTEM

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ABSTRACT

This project is based on the feasibility study of replacement of Bare conductors with Aerial Bundle Conductors in distribution system. The distribution system under the study belongs to the coastal belt of the country. The reason for this is that there are specific issues pertaining to the distribution lines with bare conductors. The study also looked at the economical viability of use of ABC against bare conductors of the area.

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The reliability parameters of both types of conductors and energy not served due to the faults in bare conductors were analyzed. The additional cost due to replacement of bare conductors with ABC, operation and maintenance cost of ABC and bare conductors were discussed in this project.

At present in Sri Lanka the penalty due to unserved energy by the utility company is not practiced. In this project penalty factors used by various countries were discussed. The use of penalty factors for the Sri Lanka also discussed.

Finally, considering all the factors technical judgment on replacement of bare conductors with ABC was made.

Keywords: ABC – Aerial Bundle Conductor

Abstract No: EE302

LI-FI BASED MULTI-ACCESS INFORMATION BROADCASTING SYSTEM

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ABSTRACT

Li-Fi stands for Light-Fidelity which uses Light Emitting Diodes (LED) for high speed wireless communication. LiFi provides transmission of data through illumination of a LED light bulb which varies its intensity faster than a speed that human eye can follow. Using this technology data speeds over 3 Gb/s can be achieved with a single micro-light emitting diode (LED). It uses the free space medium to deliver high-speed communication in a manner similar to Wi-Fi but provides better bandwidth, efficiency, availability, security and speed than Wi-Fi. Even though

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LiFi can be used in many applications it is still in the research level, especially in Sri Lanka. But it is worthwhile for undergraduate students to study and do experiment with LiFi technology for updating their knowledge in current emerging technologies. As an initial step this project aims at introducing Li-Fi technology to the students in the Electrical and Computer Engineering Department of Open University, through a laboratory demonstration.

This Model is mainly focused on one-way communication from light source to multiple users implementing Li-Fi theory with combination of CDMA technology to provide access to individual data to individual receivers. Here, CDMA technology is used to provide multiple data access and it is used to spread the incoming data to an intended user with the particular user's spreading code or the key before sending over the light. Then the signal is transmitted over light as serial data stream. Due to fast switching capability of light the data could send high speed via the light beam. Serial data sent over the light captured by the photo sensor of receiver and converted to electrical data stream of 1's and 0's. The data is then de-spread to receiver spreading code or the key to extract data. If the data is not sent for the particular user, the received data become meaningless data signal. Only intended user will be able to de-spread received data. Two types of data, audio and text sent through 2 users could be successfully detected at the receiver using this demonstration model and further improvements are done to increase the number of users.

Abstract No: EE303

POWER QUALITY ANALYSIS OF AN INDUSTRY CONTAINING NON –LINEAR LOADS

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ABSTRACT

Both electric utilities and end users of electric power are becoming increasingly concerned about the quality of electric power. It is an umbrella concept for a multitude of individual types of power system disturbances. One such major concern is the **harmonics** which is made the focus of study in this work. This project is basically concerned with the **Analysis and Mitigation of power quality** issues due to Harmonics generated by Power Electronic Converters. Harmonic due to motor drives of a particular factory was studied in this project. This project also attempted to give a solution to frequent burst of capacitor banks in the factory.

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The reasons for burst of capacitor banks were studied in the project. The investigation of harmonics has been carried to evaluate the **Total Harmonic Distortion** (THD) of the converters with and without filters. Simulation software has been used for detail analysis of the harmonic in the factory. The use of **passive filters** as a mitigation techniques has been discussed at the end of the project.

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Abstract No: EE304

EARLY DETECTION DEVICE FOR MICROBIAL SPOILAGE OF FOOD

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ABSTRACT

People who live in modern society pay more attention to food safety than price, because of a lot of known diseases are transmitted through food. Freshness is the main factor considered by customer when purchasing food items. Perishable food can be easily spoiled by microbes. Microbial attacks can be happening during food production, food processing, and transportation. This will also lead to food spoilage which causes burdensome food wastage. The traditional food spoilage detection methods were sensory identification, physical detection, chemical detection, microbial appraisal methods, etc. These methods have many problems like long experiment cycle, high equipment cost, and necessity of laboratory environment conditions. Therefore, there is a requirement to develop cost effective, accurate, low-cost

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spoilage detection device, to replace the current time consuming and costly methods. The objective of this study is to design / develop spoilage status analyser which can detect evolving gas concentration of meat products. Meat is composed of water, protein, fat and some carbohydrates. Enzymes and bacteria will decompose the meat into volatile gases. The protein will decompose into ammonia, the fat will decompose into aldehydes and aldehyde acid, and the carbohydrate will decompose into alcohol, ketone and carboxylic acid. In the process of spoilage, these gases concentrations will increase exponentially. In this project these gases were detected using special gas sensors and judgment of the meat's spoilage status was made with these data. A classification based on many parameters give a quality approach to get a final spoilage status. In this work a modern statistical data classification technique; support vector machine integrated into the system. The obtained results demonstrated good performance in discriminating meat samples in one of the two quality classes. Further studies need to carried out to assure the accuracy of equipment data with microbiological assay using total plate counts and added to the algorithm. Food spoilage detection device could be used for food inspectors to ensure the quality of the meat food products.

Keywords: Electronic nose; Meat spoilage; Support vector machines; Gas sensors

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Abstract No: EE305

SOLAR-BATTERY HYBRID SYSTEM FOR SMALL SCALE IRRIGATION IN RURAL AREAS WITH COUPLING OF AN INDUCTION MOTOR

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ABSTRACT

Sri Lanka still depends on agriculture industry. Irrigation is an important and complex process in agriculture. Most of the farmers use conventional irrigation methods which are very costly and inefficient. Those irrigation systems consumed significant amount of energy during irrigation periods. Therefore, operating irrigation systems which powered by solar energy would be very important. Sri Lanka is an island in the Indian Ocean, situated in the south India just above summit. Daily solar resources vary from 4.2 to 5.6 kWh/m²/day across the country, with the lowest values occurring in the hill country in the south-central region. The results also showed that Sri Lanka does not experience sharp seasonal changes in solar resources. Electrical energy produced by photovoltaic panels can vary from the estimated value due to environmental factors. Conventional systems like Diesel/Kerosene water pump systems have high running and maintenance costs though the capital cost is low. PV irrigation systems powered by DC water motor and drip irrigation systems are more popular. It is possible to operate irrigation systems which have DC water pumps and small-pump power like drip-irrigation with electrical energy produced by solar energy. Those are simple in design and small in size owing to cost consideration compared with single phase induction motors. Studying an induction motor coupled irrigation systems which has efficient and inexpensive characteristics. In this study, induction motor coupled with less operation and maintenance low cost efficient method of irrigation is presented. A household induction motor-pump (0.5Hp) system is coupled with photovoltaic panel via an appropriate inverter. Operational Amplifier based low cost control algorithm is used to minimize the errors of MPPT. Starting of the induction motor is performed by 12V/90Ah Battery backup. This system is capable of switching in between PV panel and battery backup according to the irradiation level. Performance of the solar energy capacity of the established system will be evaluated in real time situation using a water well. As regards of results, design values of the irrigation system fed with solar energy in Beralihela area, Thissamaharama region.

Keywords: PV generator, induction motor, op amp based control algorithm, modified inverter, low cost.

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Abstract No: EE306

AUTOMATED TUNING FM RECEIVER

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ABSTRACT

FM receiver tuning method used in the field of communication is not very user friendly and needs support from transmitter station for its functionality. To overcome this shortcoming an attempt was made in this project for an automatic tuning FM receiver.

At present only one method is used for FM radio auto-tuning, which is Radio Data System Alternate Frequency Function. (RDS AF). For this method, receiver equipment should support the RDS standards and commercial FM transmitters should transmit the RDS signal with the radio channel. In Sri Lanka, RDS AF function is not used at this time.

The attempt of this project is to develop a user-friendly tuning mechanism, which independently works without the support of the transmitter unlike with the RDS.

By combining two radio ICs with an Arduino Uno board, the new unit is composed of one radio IC as signal measuring unit while the other is controlled by Arduino as radio output. Database stored in the Arduino Uno board contains two frequencies assigned for a particular FM station. A user can simply select a pre-programmed FM channel or seek a frequency band between 87.5 to 108 MHz for a preferred radio station. Our program then identifies the alternative frequency for that channel and changes it when the tuned frequency gets weak to ensure satisfactory continuous hearing of the preferred channel when travelling island wide.

By this proposed method, the project objective could be achieved. Interference of RF signals with high power transmitters of nearby frequencies can affect the output audio quality.

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Abstract No: EE307

INTEGRATED HIGH SECURITY ACCESS SYSTEM

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ABSTRACT

The reliability of the various methods used for user access verification is not at its best. To overcome this shortcoming, an attempt was made in this project for an Integrated High Security Server Room.

At present, many methods are used for user access verification. To give three examples - character based, voice based, finger print based verifications. Of these methods, normally only one method is used at any one instance. This is the reason why we cannot guarantee the reliability of user access verification. In this research, in order to maintain reliability at a higher level for user access verification, our attempt was to improve the level of access security and collaborate the related notifications.

By combining all methods of user access verification used in an order of preference, we can count on the reliability of user access verification results than using one such method at that access instance. In one instance, two or more methods that are considered useful are combined with a pre-defined sequence. Each sensor has its own database that consists of the user information related to that sensor and is built according to the administrator's requirements. The user tries to authorize his identity using each sensor. It will generate a bit pattern that is previously stored in user database if it exists in the relevant database. If the generated bit pattern and relevant user's bit pattern in user database are the same, a digital equality comparator will send a signal to the mechanical lock through the electrical circuit to open the door. If not, the system will indicate an unauthorized message.

By this proposed method, we could achieve the expected outcomes. However if the voice fitness of a user is not good it is difficult to verify his/her voice based identity. In such a situations, an alternative method is required. In the same way in a surrounding with noise disturbances, the voice based identity cannot be used.

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Abstract No: EE308

MUSEUM NAVIGATION SYSTEM WITH BEACONS

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ABSTRACT

Bluetooth Low Energy (BLE) is the new specification of Bluetooth available for all new smart-devices. It is a new low power consumption technology aimed to transmit small amount of data. In addition to be able to transmit data, BLE can be used to locate objects. iBeacon[®] protocol, which uses BLE, is aimed at that objective with special attention in proximity location with BLE beacons. This is a new technology and as yet it is unclear how it will be used. In conventional museums, information or explanation of exhibited artifacts is presented by using panels or leaflets. Some museums are complicated places to navigate within. They may not have a clear path through the museum and may offer many alternatives. The problem is complicated even further given the fact that a visitor usually has limited time for a visit and missed some important place. However, such paper maps may be inconvenient and not easy to use, especially when a group of visitors is visiting the museum together. The objective of this project was to implement an Android app "Museum Navigation System" based on Bluetooth Low Energy beacons and the iBeacon[®] protocol. Here an Android app illustrates navigation and information on the smart device by using Received Signal Strength Indicator (RSSI) power, Universally Unique Identifier (UUID), major and minor of beacon frame. Here 3 Beacons were used Cluster to find the position. First scan for beacons and then RSSI power values save in an array. Then it selects 3 beacons by sorting values of RSSI power. RSSI-based triangulation method used to find the position in cluster and when the user move to the next cluster region it identify by the scanning route. Then user coordinate of position and direction on the map were displayed by app.

Keywords: Bluetooth Low Energy, BLE proximity location, iBeacon protocol, 3 Beacons Cluster, triangulation.

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Abstract No: EE309

IMPROVED SPECTRUM SENSING WITH PRIMARY USER ACTIVITY MODELING IN COGNITIVE RADIO NETWORKS

Page
31

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ABSTRACT

Cognitive Radio (CR) is one of the most promising technologies to address the spectrum scarcity problem. Cognitive radio requires spectrum sensing, which is used by unlicensed users to opportunistically access the licensed spectrum. One of the main requirements of spectrum sensing is to detect the presence of the primary users as fast as possible. The key characteristic of CR system is that it senses the electromagnetic environment to adapt their operation and dynamically vary its operating parameters, specially the frequency. At the same time, cognitive radio must detect the presence of primary users to avoid interference. Spectrum sensing helps to detect the spectrum holes (unutilized bands of the spectrum) providing high spectral resolution capability.

In this project, primary user activity modelling is used as the methodology, in order to provide a reliable detection and to predict the availability of channels in the spectrum. Through the review of literature, similar cooperative, non-cooperative sensing schemes, Poisson modelling and primary user activity index for first difference filter clustering techniques were investigated and summarized their advantages and drawbacks. Spectrum sensing using primary user activity modelling offers high throughput and high predictability. In this work, a comprehensive performance analysis of the proposed methodology is developed for quasi static, fast fading and deterministic channels. One of the promising work which has been done so far, is modelling the activities with the Poisson process by means of a single parameter λ . In this proposed methodology, the λ and μ parameters have been changed dynamically, and has obtained 88% of high predictability of occupancy. Also the percentage error was obtained as 5% for deterministic channels. In this extensive work, a mathematical equation is derived for the predictability by means of the complementary Gaussian error function. Moreover, through MATLAB simulations and using an optimization it has verified the superior performance of the proposed scheme compared to the existing ones.

Keywords: Cognitive radio, Spectrum sensing, Cooperative sensing, primary user activity modelling, Complementary Gaussian error function.

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Abstract No: EE310

DEVELOPMENT OF AN INTELLIGENT CUTTER HEAD FOR AUTOMATED RUBBER TAPPER

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ABSTRACT

Large scale rubber plantations are one of the key components, in the Sri Lankan economic plantation sector. The current process of rubber tapping is a labour intensive manual process which leads to a high labour cost. In the near future the world is going to face a severe shortage of availability of rubber tappers. Hence, the requirement of identification of a technological solution to handle the same issue is highly desired and it would have a significant benefit.

Taking this problem into consideration, engineers all around the world are trying to develop alternative ways for rubber tapping. But until today, no proper solution has been developed. Due to many drawbacks of the existing systems, tapping sector is still moving in the same traditional path. If a rubber tapping machine can move from tree to tree, it needs only one tapping machine for a certain rubber plantation. However, the trajectory of the cut differs from tree to tree. Thus an important aspect is the detection of the trajectory of cut in a rubber tree. Therefore developing an image processing based system to identify the trajectory of cut and an intelligent tapper head has been proposed in this project.

The main and the most challenging part is image processing algorithms which determines the trajectory of the cut. Second part is the selection of optimum hardware specification and developing the design to suit plantation environment for removing a thin layer of bark. In this machine, there is a start button to provide a start signal to a controller unit and industrial camera to capture the images. As the light conditions differ in rubber plantations it is very important to check the light conditions and uses a flash light when taking images if necessary. Cutting tool is always kept perpendicular to the rubber tree and kept at same distance by using distance measurement sensor. Stepper motors are employed for coordinate movements; servo motor is used for cutter head movements and direct current (DC) motor is used for cutting tool rotations. When start signal is provided to the controller the machine detects the trajectory of the cut automatically and makes the cut accordingly.

This machine has been developed with the latest technology and this will make a huge impact on the rubber plantation industry.

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Abstract No: EE311

WIRELESS SENSOR NETWORK FOR STRAIN MEASURING IN STEEL STRUCTURED BRIDGES

Page 33

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ABSTRACT

Bridges are more important and economical icon for public and industrial transportation. The health of the bridges decides the safety of the users. Continuous monitoring of structural health of bridges indirectly helps to establish an efficient transportation network around the country. Efficient measuring techniques help the experts to make a powerful decisions in this regard.

Usually, strain gauges based wired monitoring systems are being used with off-line stored data analysing facility. In this project, an Internet of Things (IoT) based continuous monitoring system has been proposed which directs the engineers to online trend analysing and monitoring with higher reliability. Several techniques were introduced to transmit fast and secure strain parameter data to the end user. Key techniques are, twisted pair and three wire arrangement have been used to transport micro-volt range output signal of sensor element (strain gauge) to the sensor node (or transducer node) with high reliability. Internal noises of the transducer circuit has been reduced by limiting operating current. Then RF and GPRS communication techniques facilitate to transmit the sensor output signal up to user end. Furthermore, frequency division multiplexing, optimum memory allocation of the *ARDUINO* and re-sizing the payload are used to establish fast data collection and fast data movement through the network. *THINKSPEAK* IoT interface is being used as graphical user interface (GUI). Finally, total integrated solution had been introduced to measure, monitor and analyse the online data and fast decision making power is being facilitated to the experts in order to maintain safer transportation networks all around the island.

Keywords: Structural health, Strain monitoring, Internet of Things, Transducer nodes, Trend analysis, Graphical user interface

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CHECKMATE WEB ANALYTICS TOOL



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ABSTRACT

In the current day and age, it has become paramount for businesses to have an online presence. This has enabled organizations to keep up with the pace of their competitors in the market. However, having a website alone has proven to be not enough. It is essential to monitor the business progress that a website yields. Owing to the availability of web analytics tools, business owners have long been able to fulfill this requirement. With effective tools such as Google Analytics, companies can track and analyze data pertaining to web traffic and even identify which keywords bring the most number of visitors to their websites. Getting an insight into these factors is highly beneficial when it comes to making data driven decisions in any business with an online presence. However, web owners have to use each tool to measure different metrics which takes a significant amount of time and effort. This is where CheckMate comes into the picture. It is designed as an all-in-one tool which features the most essential metrics in one place. With a highly secure registration process that validates the ownership of websites, it serves as a user friendly tool that even a website owner with a limited level of technical knowledge could utilize. We aspire to adhere to a fetch-analyze-retain policy which essentially means that following the analysis of a registered website, the processed data is converted and presented in different views and stored in our database thereafter. After imitating the responses that are obtained through APIs, the rest of the functionality is carried out at our end. Additionally users can opt to receive special notifications when drastic changes happen in their search engine rankings. The user's web data that is pulled from the APIs is processed through a special algorithm to identify these changes and generate the respective notifications. Yet another requirement we seek to address with our tool is the generation of an analysis report which presents an easily understandable, yet detailed summary of the results which can serve as the basis for data driven business decisions. A user who has registered with multiple websites can see the highlights of all, in one screen, which is a feature that is not offered in other web analytics tools. CheckMate allows them to compare the results of one particular metric for multiple websites they own. Once an analysis report is generated, the user is allowed to download it.

Having categorized the metrics under the sections; user behavior analysis, market analysis and web performance, CheckMate is developed with three main modules as the foundation: the user account creation phase which allows an admin to create it with different access levels for two other users, the data gathering and analysis phase and the report generation phase including the conversion of processed data to charts and other presentation formats. Featuring an alluring user interface, CheckMate aims to make the entire process of checking a user's web analytics results, a unique web experience in itself.

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VEHICLE MAINTENANCE AND I



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ABSTRACT

As the transportation plays a major role in productivity, gradually vehicle becomes a basic need of humans. Vehicle is a machine that should be maintained carefully for proper operation. Manufactures always advise motorists to follow automobile manufacturers' recommended maintenance schedules to improve the reliability and longevity of their vehicles. It was identified that, there was no proper way to identify, at which condition the vehicle should be serviced. Vehicle manufactures always give only a certain mileage as the servicing interval. There is no a proper analyzing method to identify the real condition of the vehicle whether it requires service. Pre-analysis method to identify the real condition of the vehicle and predict the servicing interval is a better approach for healthy vehicle. Objective of this research is to predict the serving interval for a vehicle by analyzing the recent conditions variation with time. According to literature, most affecting reason for deciding the servicing interval is the degradation of engine oil. Most manufactures recommend the servicing interval according to engine oil's lifetime. In this research, proposed method of the service date prediction is based on the variation of engine oil degradation. Engine oil degradation is proportional to mileage. Here measuring parameter is the engine oil's viscosity which is the main quality of oil. Proposed system measures the viscosity of oil daily and stores the data. Then it analyzes the data and finds a mathematical model of viscosity degradation against time. The system then predicts the service date according to the model. Proposed system has been tested with a prototype. Viscosity and temperature sensors are inputs to the system. Prediction is displayed on a LCD Display. Data processing is done by a microcontroller. In this research, ASTM D341 standard has been used to calculate the viscosity of engine oil at a required temperature using two viscosity values at known temperatures.

Abstract No: EE314

INTELLIGENT SOCKET OUTLET FOR CHARGING OF ELECTRIC VEHICLES

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ABSTRACT

A major challenge in the power sector is about to take place since the main Japanese and Asian car manufacturers have announced that all manufactured cars from 2017 will be battery powered. Considering the UK's commitment to reducing greenhouse gas emissions by at least 80% by 2050, it is a great opportunity to invest in the power sector to deal with challenges presented by high demand of electricity. The major effect of increasing the number of Electric Vehicles (EVs) on power systems is the creation of a significant domestic demand for electricity. Electric vehicles are in the forefront of emerging zero emission technologies that are essential for a sustainable future. Due to the fast growing demand for electric vehicles, it will be a key point to consider when managing the power utilization in Sri Lanka. As peak demand is heavily catered using diesel power, commercial and environmental success relies on concentrating vehicle-charging activities to non-peak hours. An intelligent interface between electricity supply and electric vehicle will help to optimize the electricity demand and reduce the weight at peak demand time. This project worked towards to design and develop a cost effective, high accuracy intelligent socket outlet for charging of electric vehicles, minimize the effect of Electric vehicle charging on national grid, and reduce the Environmental and Economic impact. As the basic part of project output "optimal charging pattern which will control the power from the socket outlet" is developed. The main contribution of this project is to propose a system based on SOC of EV battery, user inputs and power demand data. *To do so, the parameters in literature have been used separately; however, this project proposes that all of them be combined in a single model in order to obtain more precise and realistic results.* This device will help to distributing electrical energy in an efficient and intelligent manner to many applications without overloading the supply and create smooth operation of the entire electricity system across whole of Sri Lanka.

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Abstract No: EE315

E-සේවාව - ONLINE SERVICE PROVIDERS INTELLIGENT SEARCH SYSTEM

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ABSTRACT

The use of mobile devices has become a part of our daily routine. Recently, mobile devices like mobile phones or portable digital displays (PDAs) are equipped with global positioning system (GPS) receptors that allow us to get the device's geographic position in real time. Location Based Services (LBS) are regarded as a key feature of many future mobile applications.

When person needs service to buy immediate at expectable price with quality, they need to find a service provider. They need to search in the internet, reading phone book (such as yellow pages) or ask from someone. When consider about a service, it is difficult to find a service provider directly at reasonable price and nearest provider. Ex: Electrician, Plumber, Mason, Tailor, Serves cleaner, etc.

The e-සේවාව System will be a global Web-based marketplace bringing together private individuals and small companies to buy and sell all manner of services. It will take advantage of the Internet and World Wide Web to radically improve the way they buy and sell services. Now e-සේවාව comes in handy to your smart phone or tab. Download app for your smart phone. e-සේවාව is an online locator service, also known as location finder, store finder, or store locator, or similar is a feature found on App of businesses with multiple locations that allows visitors to the site to find locations of the business within proximity of an address or postal code or within a selected region. Types of businesses that often have this feature include chain retailers, services providers (Electrician, Plumber, Mason, Tailor, Serves cleaner) hotels, restaurants, and other businesses that can be found in multiple metropolitan areas. Mobile application develops using android and each interface view includes registration for system, guest / register user login, intelligent search about services. When consider about mobile Communication e-සේවාව use restful service with json. Request Generation Process is generating the search scenarios based on previous searcher of all users and sort out the best provider around his Geo Location. GEO fencing Filters use to process the providers been filtered by the reach ability of the Geo location. e-සේවාව often operate in conjunction with a well-known online map service, Google Maps allowing the user to see on a map where the particular location is found on a map.

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Abstract No: EE316

MOBILE SOLUTION FOR NEXT LEVEL OF FARMING MARKET

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ABSTRACT

Agriculture is the main livelihood for people in some Asian countries including Sri Lanka. More than 60% of people engage in agriculture production activities and connected services. Paddy, fruits, vegetables, tea, rubber and coconut known as main crops and plays an important role in Gross Domestic Product (GDP). Therefore, agriculture is the main force of the country's economy as it supplies the staple food rice for 20 million people. However, the prices of agricultural products are very low in the open market. Hence, even after all the hard work and the production done by the farmers, they are living in poverty. There is no computerized system present for the farmers to know the product rates at different markets where they can sell their products for achieving high profits. According to the study of current process of the market, it observed that there is a gap between farmers and buyers due to lack of knowledge discovery, lack of information, language barrier, less competitive market environment etc.

Digital transformation through the Information technology (IT) makes significant improvements of businesses and industries. Effectiveness of business process and efficiency of management can be archived by using information technology. However, the low involvement of technology and IT is the most critical issue in the agricultural sector. Smart mobiles have made huge impact on the growth of IT sector and digital communication in Sri Lanka. This research is to provide a mobile base solution to reduce the gap between farmers and buyers together with competitive market and market equilibrium.

FarmMart is a mobile base solution for market activities and provides support to make market decisions in an informative way. Farmers and buyers are able to input their selling and buying details of crops and get needed information in an easy manner to create online orders through the system. System supports bidding functionality which users can achieve competitive prices for their trading. A Rule base fuzzy logic expert system is built for searching and matching algorithm of the system. User can accept one or more orders received form internet and also can contact transporters for supply purpose through the system.

Nowadays most young farmers are familiarized with mobile technologies, which would be a great opportunity to take a step forward to m-commerce with e-farming that can make a huge impact for the marketplace to make effective communication and competitive market environment. FarmMart is a mobile base online marketplace that expands the market space of users and provide plenty of information, which support decision-making process, which will change market situation to create next generation of the agricultural market by avoiding the language barrier using various intercommunication strategies.

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Abstract No: EE317

ELECTRONIC CURD QUALITY TESTER

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ABSTRACT

Curd is fermented milk product, which is packed in a clay pot, and is one of the most traditional dairy products in Sri Lanka. There are some prescribed standard requirements for processing of curd, and the preservation is one of the requirements with respect to the Sri Lanka Standards. There is no adaptation to obey the rules and regulations prescribed by the SLS for manufacturing curd and therefore the main parameters are not up to the level with respect to the SLS. Although, based on the information obtained to the Head, National Poisons Information Unit, NHSL, Dr.Waruna Gunathileke says "Pots of curd liberally laced with formalin, are openly sold in food outlets". According to the facts obtained, it is a worth need to develop an electronic device to test the quality of curd.

There are many parameters should test for the curd quality as stated by SLSI. However, the main aspect was to make the test for the key chemical parameters, which are Fat, Solid not Fat (SnF), and pH, as well as formalin content as it is a highly toxic and carcinogenic preservative.

This project worked towards to design and develop a cost effective, high accuracy curd quality tester to replace the complex, time consuming laboratory process (e.g. Gerber test) and as a solution to detect formalin. An optical method for curd fat analysis has been developed. This method is based on the phenomenon of light reflected by fat particles after scattering takes place. In here, FAT, pH and Formalin have been measured using sensor method and SnF content was measured using the Richmond's Formula for milk.

The results of samples, which were tested from the chemistry laboratory of Wayamba University of Sri Lanka, have been added to the neural network and done tests with the designed system to increase the accuracy. The given results were satisfied.

This design of the device makes it more mobile and easy to use in the field operation, especially by the food inspectors to check the samples in the food outlets, and it ensures quality proven experience for curd consumers in Sri Lanka.

Keywords: Curd, Fat, SnF, Formalin, Optical

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Abstract No: EE318

SMART SPECTACLES TOGETHER WITH ANDROID APPLICATION FOR THE VISUALLY IMPAIRED COMMUNITY - "HOPE"

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ABSTRACT

In the modern world, science and technology plays a major role in the lives of human beings, making living standards high and comfortable. Nevertheless, all the humans do not have the luxury to benefit from these resources. 285 million people are estimated to be visually impaired worldwide, and out of these, 39 million people are fully blind. In Sri Lanka, visual impairments affect a considerable percentage of population, and 200,000 are fully blind. Even though there are many smart gadgets for assisting them, many cannot afford due to high costs. Most of these visually impaired people undergo high stress and feel left out in the dark due to the inability to carry on with their day today activities.

Over 95% of visually impaired people use "white canes" mainly to support them in guiding their way and avoiding obstacles. These people find it difficult and almost impossible to find their location, identify colors, navigate themselves along roads, identify currency (many currency notes are of almost same size), and identify road symbols. As a smart solution for all these burning issues, "Hope" application has been designed.

"Hope" is an Android application which connects with a specially designed pair of spectacles for visually impaired people. This system runs fully on voice commands, so that the user can communicate with the application by using the voice. Some of the unique functionalities of "Hope" include, identification of currency notes, user's exact location identification, helping user for road navigation, color identification, and object identification such as road symbols. The feedback is given to the users via voice (speech) by the system. A camera placed in the spectacles captures all the necessary images, and feeds them to the android application which processes the images and delivers an accurate feedback to the user.

The "Hope" system will be a solution to most of the issues faced by the visually impaired people. They will no longer face difficulties in travelling and other basic day today activities which also include money transactions. They will no longer be mentally stressed or feel left out, because with the help of "Hope", their life will become more comfortable.

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Abstract No: EE319

FEASIBILITY STUDY OF VIRTUAL PUMPED STORAGE BATTERY BANK FOR DOMESTIC ELECTRICITY CONSUMERS

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ABSTRACT

In Time of Day tariff system, all electricity consumers have to pay higher per unit energy within peak hours than in off peak hours. Also electricity suppliers have to spend additional cost to produce electricity during the peak. Because the additional demand is supplied by high cost peak load power plants like diesel generators. As a result of fossil fuel usage it increases the unit price and also cause to increase CO₂ emission which pollutes the environment. To overcome above problems, a Battery Bank has been proposed that can be used to obtain a flat demand curve at the consumers' premises. The main objective was to study whether this system is economically feasible. This is an automated system that identifies the peak time according to the previous data of demand variation. During off peak, it charges the battery bank by from the supply. During peak hours, the battery bank supplies energy to the consumer load according to the load condition, in order to minimize the power acquired from utility.

The system has been stimulated using Simulink and implemented the control circuit of the system in a prototype. The total installation cost of the system has been estimated. By referring the daily generation profile data of Ceylon Electricity Board, the generation cost of peak and off peak hours has been calculated. By using calculated information, the total economical saving when the system is installed has been evaluated. According to the calculations of generation costs, there was no significant cost difference between peak and off peak. As a result, the saving is insufficient to recover the capital cost. Therefore the proposed system cannot be considered as economically feasible. In calculations of electricity generation, merit order dispatch has not been considered due to unavailability of data. Therefore the exact saving could not calculate. It will be taken in to calculation in future development of the system and thereby expect more detailed analysis.

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Abstract No: EE320

COMPUTATION OF ENERGY NOT SERVED COST FOR SRI LANKA MODERN POWER SYSTEM

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ABSTRACT

A reliability study is an essential aspect to increase power systems reliability in quantitatively and qualitatively for a proper power system planning and coordination. The indices produced in these applications are utilized in a wide range of management decisions throughout a utility. One issue, which is often debated, is the cost associated with a particular level of reliability. For that it is necessarily needed a particular level of reliability study to identify the losses incurred of losing the power supply.

Estimation of respective loss as a cost function is economically beneficial to the service provider to mitigate the economic loss in future planning and designing of power system expansions. For computation of Energy Not Served (ENS) cost for Domestic, Industrial & Commercial consumer categories is a must. Basically unserved energy constraints will effect severely to each consumer category where it indirectly resulting drastic effects to Gross Domestic Production (GDP) of the country as well as environmental pollutions because of running the backup generators. As for the Ceylon Electricity Board past records of ENS (Energy Not Served) shows that the cost is around 55 Rs/kWh, in 2002. Therefore, since there was a significant development in commercial and industrial sector, this figure has to re-evaluated and re-computed.

This research study is based on computing particular level of Energy Not Served cost for Sri Lanka modern day power system by using a comprehensive customer based survey methodology.

Keywords: Energy Not Served, Gross Domestic Production, Industrial consumers, Commercial consumers, Domestic Consumers

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Abstract No: EE321

FEASIBILITY STUDY OF FUNCTIONING THE ELECTRICAL SUPPLY OF OUSL ELECTRICAL LAB AS A MICROGRID

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ABSTRACT

The aim of this project is to use solar power for the electricity supply of OUSL Electrical laboratory while maintaining it as a microgrid. The concept of the micro grid is distributed generation and use renewable energy sources for the generation of electricity. Because of the use of renewable sources, it can reduce CO₂ emissions from fossil fuel based generators, and also reduce the transmission losses of the utility system. Therefore the microgrid concept helps to green energy utilization. The microgrid proposed for the premise had to be decided whether the main objective is energy conservation or reliability of supply. For this study, the load profile has been recorded by measuring the load at different stages. Since the load is varying by large amounts due to laboratory activities of study programs it was required to record the data at all condition. Due to the unavailability of certain data, it was decided to estimate the load profile based on available data. In this project it was studied the types of storage devices, specifications of solar panels and methods to supply optimum demand capacity using the solar power to the premise. The availability of solar energy at the selected premise has been evaluated based on the data obtained from the Meteorological Department of Sri Lanka. The irradiation and temperature variations during the day time have been analyzed and thereby calculated the maximum available solar power at the premise. According to the consumed electrical power and the energy by the loads of electrical lab, the required power and the energy for a period of one month have been calculated. The capacity of the microgrid was determined according to the available solar power, temperature, available area at the premise and other technical frame conditions. In addition SAM (System Advisor Model) software has been used for simulations and calculations. Finally, the economic and environment feasibility of the solar powered microgrid for electrical lab has been discussed.

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Abstract No: EE322

NEW CONCEPT FOR OBSERVING SLOW TRANSIENT ON ANALOG OSCILLOSCOPE

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ABSTRACT

Circuit testing is one of the most important areas in electronics design and fault diagnosis. Among the widely used testing methods, signal analysis using oscilloscope is the major technique for time and frequency related circuitry. Signal patterns describe important parameters of a system such as transient, steady state, and noise. Common analog oscilloscopes can show repetitive signals in the range of 100Hz to 300MHz only. It starts the sweep trace which is triggered at a selected voltage level on the repetitive signal, providing a stable display because of the repetition of same trigger point. In non-repetitive signals, this trigger level does not repeat at same interval. Hence it is difficult to observe such signals in analog oscilloscope. This project introduces a new concept for showing slowly varying and non-repetitive signals on analog oscilloscope. As in the storage oscilloscope this new concept first acquires signal data within the transient period which is not repeated again. It is then regenerated and repeated at a faster rate in order to get a stable display on analog oscilloscope. Proposed system consists of four parts namely, analog to digital converter, controller, memory, and digital to analog converter. There are five selection modes to be used for different types of transient responses. The system waits for a trigger voltage to get activated and acquire data through analog to digital converter. It is then saved in system memory and the controller starts repeating the acquired signal data repetitively in a faster rate. This faster rate ensures a stable display on analog oscilloscope. Slowly varying signals and transients observation on analog oscilloscope is a novel approach that basically improves the utilization efficiency of the circuit measurement testing such as Feedback control system, Electrical insulation test, observation of armature current of a motor and RLC circuit responses. Therefore using the proposed system, it can increase the analog oscilloscope's capability to a greater extent.

Abstract No: EE323

ONLINE ELECTION SYSTEM FOR OUSL

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ABSTRACT

The Open University Sri Lanka (OUSL) use a manual process to elect members for student union and student representatives for Faculty Boards. In the existing voting process, sometimes it becomes quite inconvenient due to the reluctance of certain voters to visit the Colombo regional center to cast their vote. Moreover, the increase in number of false votes in the manual process has made it necessary to develop a secure Online Election System (OES) for OUSL.

OES eliminate paper ballot from the OUSL voting process. Electronic voting technology can speed the counting of ballots and can provide improved accessibility for voters. When registering with OES as a Voter or a Candidate, an undergraduate has to complete pre conditions. The system make sure all the eligible voters have satisfied all of the pre conditions to allow them to vote for the candidate of their choice. During the voting process, system ensures the maintenance of authenticity by providing a secrete password to the voters before the vote is accepted to the main database. This authentication mechanism help voters to cast their vote securely. In addition, OES uses selection method ensure to select fifteen members with four female representations.

OES provide a cost effective solution for the OUSL while ensuring high security and integrity of the votes to voters. Hence, this easy and secure voting model enhance the voters' scope for participating in the election and reduce the number of false votes. The main benefit of this system is that the voter would be able to vote from outside the Colombo reginal center or from any preferred location. Furthermore, the usage of online voting has the capability to reduce or remove unwanted human errors. In the OES the tallying of the vote will be done automatically, thus saving a huge time and enable to announce the results with a very short time.

Abstract No: EE324

“SAFE DRIVE” VEHICLE CRASHING AVOIDING SYSTEM FOR OLD CARS

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ABSTRACT

Globally, close to 1.3 million people die in road crashes each year, at an average of 3,287 deaths per day. Road crashes cost USD 518 billion globally and cost USD 65 billion for the low and middle-income countries annually. Due to vehicle accidents that happened in 2015, cost of road crashes in around US.\$230.6 billion per year and average of \$820 per person. Most modern cars are equipped with sensor and smart technologies to detect and in some cases even to avoid collisions. However, most of the vehicles in the developing world lack smart features. It is estimated that in Sri Lanka 76.47% of cars are old cars without Smart car options. Usually, cars are used for many years due to economical reasons.

We are introducing “Vehicle Collision avoiding System” that will enhance the “smartness” of old vehicles and reduce the probability of collisions and hence injuries to humans and damages to property.

This system is designed for users of old car user that use Android devices. This system consists of close object detection capability for moving and non-moving objects. It is able to detect if the vehicle is going to crash into an object within a given distance. The system uses sensor data collected through radar sensors and GPS data for its analysis. If the system detects a risk of a collision, it issues a voice alert and color changing (flashing) signals in vehicle display.

The vehicle collision detection system is an affordable solution for old car users to avoid vehicle collisions. It can be installed in any vehicle and requires minimum changes to the vehicle. Since the solution is uses an already existing android device, the cost to the user is minimized. By using this economical solution using modern technology, lives of many car owners and the passengers can be saved.

INTELLIGENT CHORD GENERATION

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ABSTRACT

This project is carried out to apply artificial intelligence to simulate the musical knowledge in Eastern Music. Here it was discussed the main dissimilarity between eastern and western music which is identified as harmonizing. This unique feature of Western music is the simultaneous playing of set of notes which is defined as chords. In Hindustani classical music, melodies of songs are not composed with chord progressions but use chords when played with a combination of western and eastern instruments in popular media. In contrast Western Music always composes melodies based on chords. In this project, an intelligent system is proposed to generate suitable chord progressions for a given melody in Hindustani notation system.

This system is implemented in software which facilitates to play the melody with the chord progressions. Many of the software in the industry are based on western notation. The few of the software which use Hindustani notations are *SwarShala* and *SaathSangeeth*. Since this software is based on Hindustani system, Chord progressions are not considered. Melody can be given in Hindustani method of notation using textual format. After giving the melody the software can find the relevant scale of the melody. Then the chord progressions are found according to the scale and notation. These chords are found using a knowledge base which consists of set of rules for each scale. JRuleEngine is used as the inference engine to find rules in the knowledge base. It follows the forward chaining to match a rule with available data. The knowledge base is an xml file which consists of set of rules of 'if then' format. A rule defines a matching chord considering the inputs notation, scale, level, previous note, second note, third note etc. Rules are separated to 4 levels. Level0 is defined as exactly matching chords within the notation. Level1 is defined as partly matching chord but within the scale. Level2 is defined as partly matching chord out of the scale. Level3 is defined as special rules considering knowledge in various notations of famous songs. All rules are separated from the implementation logic of the system. Therefore, we can experiment and refine rules by defining new rules in various ways.

Finally, user can play the generated chord progressions mixing with the melody. A special algorithm is designed and implemented to play notations with the timing. Optionally user can create audio file or printable format of generated chord progressions. For this project java is used as the programming language. JFugue music library is used to create sounds.

Supervisors

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**MULTI-FUNCTIONAL FLOOR CL
DISTRIBUTION TRANSFORMER**

MINIMIZE THE FAILURES

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ABSTRACT

Distribution Transformers are costly and critical equipment's in electricity distribution network. Failure of a distribution transformer results to interruption of power supply to the consumers and involve high expenditure in repair or replacement of a transformer. Protection of distribution transformer is very important as replacement of them causes large amount of money. In this project Horana area was selected for the analysis of the failure rate.

The objective of the study was to identify main causes of distribution transformer failures and to minimize those failures. This research presents the CEB distribution substation installation practices and practical situation of distribution substations which would be the causes for failures. Detailed investigation of failed transformers was carried out in order to find out actual cause for each transformer failure. As a result, the effect of lightning and overloading to the transformer failures area were studied. To minimize transformer failures, several facts were proposed. The voltage stress to the transformer due to lightning has been studied with the help of PSCAD simulation software. At the end of the project the recommendations are made to minimize the failures. This includes the method of installation of surge arresters and modifications to the earthing systems.

Keywords: distribution transformer, causes, installation, lightning

Abstract No: EE327

TECHNO-ECONOMICAL COMPARISON OF TWO METHODS AS A SOLUTION TO THE INSULATOR FLASHOVER PROBLEM IN 33KV LINE IN THE COASTAL AREA

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ABSTRACT

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Insulator flashovers have become a major problem of providing a reliable power supply in Puttalam coastal area. Contamination-driven insulator failure is a problem that incessantly plagues distribution systems. It erodes the power quality and diminishes system reliability. Contamination levels can continue to grow unless abated by natural cleaning or if not taken measures to wash insulators at the distribution level in a preventive maintenance mode. When contamination is combined with moisture, a pollution layer forms and provides a path of leakage current to flow. Increase in contamination severity result in heightened levels of leakage current activity.

This project is to find a solution to this problem. In order to assess the pollution behaviour of insulators in 33 kV distribution lines in Puttalam area, cap and pin type insulator was selected as a sample insulator and been subjected to natural pollution at the four selected localities for considerable period. The naturally polluted insulators then removed from one month time period and have been subjected for conductivity test and the equivalent salt deposit density (ESDD) which points out the pollution severity, is calculated.

The variation of ESDD with the distance from coastline is presented in the report and the optimum distance from coastline for bare conductor 33 kV line in order to minimize flash over. Also, carry out the feasibility study of use of ABC in the existing line. Finally, find out an optimum solution to the flashover problem in the coastal area after comparison of two: Redesigning the 33 kV line towards to the landside or use of replacement of bare conductors with Arial Bundled conductors in the existing line is presented in the report.

Keywords: Insulator flashover, ESDD level, Saline pollution, Insulators conductivity, Coastal area

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OPTIMUM SOLUTION FOR ENERGY SAVING

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ABSTRACT



In a garment factory, the lighting load is very high due to its required lux level. So energy saving on lighting is important. Increase of power consumption and increase of electricity bill is a major problem meet from garment factory. In this project, I propose a possible solution to reduce energy loss in the garment factory. The objectives are determination of energy saving options & carry out cost analysis after incorporating solutions to the system.

There are several theoretical methods used to energy saving. They are developing of lighting using new light sources like LED Lights, using day lighting controls in production areas with photoelectric sensors, introducing detection sensors & lighting control system, introducing distributed multiple lighting system, using task ambient lighting system. A literature survey is carried on, finding out documentary information about the project from books, journals, factory financial reports, and computerized databases. Meanwhile personal interviews and observations were also made & gathered primary data of present system of factory. Then analysed of present lighting and power system, available load and electrical energy consumed by the user. After that proposed the best technical feasible solution for the minimization of power consumption. Then I check if the proposed system is suitable for the factory.

The lighting power consumption calculated and lighting are simulated using DIALUX software. The results are satisfactory and indicate how to use energy saving methods. The relationship between the power consumption and saving power/cost is illustrated. A strong relationship between the saving in power and saving cost is obtained. Finally Economics evaluation of the remaining alternatives were carried out on a calculation basis.

Keywords: Energy efficient lighting, Lighting controls, DIALUX, Day lighting, Detection sensors

Abstract No: EE329

REACTIVE POWER COMPENSATION STUDY FOR SRI LANKA POWER SYSTEM

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ABSTRACT

Supervisor

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The characteristics of a reliable and secure electric power system is its ability to deliver in desired amounts the electrical power needs of all connected consumers while complying with the standards on frequency, appliance voltage ratings and variation limits. The power system behavior must also meet the steady state and dynamic stability criteria and has to be fulfilled the electrical power demand which increases with national development. Therefore, the national grid systems have to be periodically augmented with the addition of generation capacities, transmission lines, distribution lines and substations to keep pace with the load growth. New loads, generators, system interconnections and lines will all have their effect upon the grid system voltages, currents, real and reactive power flow. The addition of generation capacity and transmission lines cannot therefore be done haphazardly but has to be meticulously studied and analyzed with accuracy beforehand prior to implementing. This project will determine, using the PSSE Software and the CEB “Long Term Transmission Development Plan, 2017-2022, as the basis, the reactive power demands of the grid to maintain the steady state and the dynamic stability under different generating, load and fault conditions complying with the standard 33 kV bus voltage and frequency limits. The power system network appropriate to the proposed CEB Transmission and Generation plans and system parameters were fed to the program. Further, different generation combinations, demand variations, fault conditions, and the steady state and dynamic stability of the power system are also checked.

The results of the computer analysis give the size of static shunt capacitor banks that would be necessary and the bus locations at the grid substations. The result obtained agrees closely with CEB predictions for the period under review with minor deviations of the reactive power requirements at few of the grid substations. The simulation also showed that the power system dynamic stability is good during both the day and night peaks under all operational conditions for the given period 2017-2022 and automatic static VAR compensators were introduced to overcome unstable day off peaks under fault conditions. This proposed static reactive power compensation equipment will eliminate cascade power failures in the Sri Lankan national grid due to reactive power variations.

Key words: Reactive power, PSSE Software, Steady state analysis, Dynamic analysis, SVC (Static VAR compensation)

Supervisor

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Abstract No: ME301

FULLY AUTONOMOUS NAVIGATION OF UNMANNED AERIAL VEHICLE

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ABSTRACT



In the present, Unmanned Aerial Vehicles are commonly used for perform various tasks like security purposes, research and rescue, monitoring, disaster management, crop management, communications and surveys. Among all kinds of UAVs quadrotors become famous and popular, because they can be controlled easily. They can take off and land without using a runner who

Most of the autopilot systems are navigated using GPS coordinates. They use GPS receiver to get coordinates. Most of the low cost commercial GPS modules has an error about ± 2.5 meters. When considering small scale quadrotors, this is a considerable error. To assure accurate and precise landing by overcoming the GPS error, a vision based system was introduced to a quadcopter. Quadcopter "X" configuration was selected for the implementation.

Vision system uses an image of a helipad as the ground target to identify the landing point. The system consists of an on-board controller (Raspberry pi) to process images and a camera module to capture image and an Arduino mega to control the quadcopter navigation and Pixhawk flight controller to control the quadcopter. First the quadcopter is navigated using the GPS coordinates. After it reached to its destination, the ground target is checked by the vision system. If the quadcopter is in the correct location, vision system gives the landing command and if there is a difference between the target and current location of the quadcopter this error is reduce by adjusting the position of the quadcopter by the vision system. After correcting the position, it gives the landing command. The system was implemented and successfully tested using a quadcopter in real-time. ± 2.5 m GPS error was reduced to the range of one meter by the vision system.

Keywords: Quadcopter, Raspberry pi, Vision, UAV, GPS

Supervisor

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Abstract No: ME302

AUTOMATED FLOATING DEBRIS & OIL REMOVING MACHINE FOR AQUATIC BODIES

53

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ABSTRACT

Pollution of aquatic environments such as rivers, canals, lakes and ponds has become a major environmental issue in today's world. Due to the lack of consumable water resources for the life in the world, it is important to clean and keep clean these aquatic bodies. Most of the people have understood this situation and involved in cleaning the aquatic bodies in several ways. But all of those methods are not much efficient and requires the direct involvement of human labour for the cleaning process. In order to clean aquatic bodies the first thing need to be done is removing the floating items from the water surface. These items would be solid waste or oil spills. The oil spills have become a major problem in aquatic pollution and the existing methods for remove the oil from aquatic bodies also not efficient. So, this study is done based on designing an automated machine to remove the floating debris and oil spills from polluted aquatic environments. For the design of this machine, a proper method was required to collect the surface water with the floating debris and throw out the water back in to the environment while the debris remain in the machine. The phenomenon of flowing in of the surface water into an immersed cup is used as the base of the operation of this machine. A submersible pump is used to pump out the water from the bottom of the cup as the debris remains inside the cup and hence the continuous operation is supposed to be achieved. Then this mechanism is attached to a remotely movable barge to obtain the design of a complete machine. The final design of the machine has a total length of around 2m and a width of 1.2m. The cup has a capacity of 32.8 litres. Once charge the batteries, the machine can work continuously about for one and half hour. Within this period it can clean a surface area of water around 900m² depending on the density of floating waste. So, in this study a deep literary survey is done to find out about the effected aquatic bodies, currently using methods to clean them and their effectiveness. And the study provides the final design of the newly proposing improved system which can be used to remove both floating debris and floating oil from aquatic bodies. Also suggests the future improvements that can be done to enhance the operation of this machine and increase the effectiveness of cleaning the surface of aquatic bodies.

Keywords: Floating debris, Aquatic bodies, Submersible pump, Solid waste.

Supervisor

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Abstract No: ME303

OPTIMIZING THE PERFORMANCE OF BIOMASS FIRED THERMIC FLUID HEATER

Page 54

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ABSTRACT

The research was concerned about performance enhancement of a 3MkCal/hr capacity saw dust fired thermic fluid heater located at Workwear Lanka pvt ltd, Malwana, Sri Lanka one of the manufacturing firm of Midas safety Inc.

The project was intended to give solutions to its lower efficiency, higher fuel consumption and excess stack temperature. Objectives were set to perform a detailed survey on existing system, identifying its drawbacks, finding out possibilities for improvements through literature survey and setting out standard parameters followed by optimizing the system performance through carrying out a theoretical analysis.

Detailed investigations were showed that the actual efficiency is 42%, stack temperature is 320 °C and higher fuel consumption due to 40% average moisture content. Combustion performance was 75%. But it was found poor air infeed through the grate bars of the bed of the combustion chamber due to damaged and warped grate bars and saw dust debris. Hence 180% of excess air was supplied to improve the combustion which was accounted for 30% dry flue gas loss. Further heat loss due to moisture in saw dust was 10%.

Three actions were recommended to overcome the problematic issues. Literature findings were greatly helped to disclose solutions. Control the air intake damper to regulate the excess air supply in the range 60-70%, selection of a belt drier for saw dust drying from 40% moisture to 10% and use of water pre heater for low heat source for drier were suggested.

Regulating the air intake damper along with grate bar bed maintenance was yielded over 80% combustion efficiency. Though the drier installation is not materialized it was proved that the above recommendations could enhance the heater efficiency up to 75%, reduce stack temperature up to 180 °C and generate saving of LKR 50,000/day from the saw dust consumption. Further the total heat loss could be reduced from 58% to 25%. Overall this research can be regarded as a guide for those who are interested in thermic fluid heaters and seeking opportunities for optimization.

Keywords: Thermic, Sawdust, Drying, Efficiency, Optimizing

Supervisor

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Abstract No: ME304

MULTI-FUNCTIONAL FLOOR CLEANING ROBOT FOR DOMESTIC ENVIRONMENT

Page 55

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ABSTRACT

Floor cleaning is major task in household cleaning process. But nowadays people are very busy with their works they do not have enough time to spend cleaning process. Multi-functional floor cleaning robot was introduced to world as a solution for above reason. The proposed method is capable to identify and classified the dirt in the domestic environment. According to dirt detected by the floor robot can decide and apply most suitable cleaning action among sweeping, mopping and vacuuming. Dirt detection is based on vision system. The vision system is introduced novel method of mud detection and proposed vision algorithm is used to separate mud and dirt elements. According to this vision base decision robot select cleaning method. The robot can be identified more than 70% of dirt and mud elements in domestic environment. Many Sensors around the main body are used to avoid collision with the floor obstacles or the fall from the stairs and sharp edges. The automatic floor cleaning action of dynamic mechanism and dust removal equipment is controlled by both electric circuit and single-chip microprocessor. For the operation of functionality and practicality, an Android base application is an added to the robot with three models, including manual operation, automatic operation, and cleaning operation. Our findings suggest that average saves more than two hour of people's time per week, floors are cleaner leading to better homes and lives, systematic cleaning is seen as an important feature, and modifications to the domestic environment to support the navigation of the robot are largely accepted.

Keywords: Multi-functional cleaning, Dirt detection, Mud identification, Floor cleaning robot, Smart controlled

Supervisor

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Abstract No: ME305

BELT LOOP PREPARING MECHANISM FOR BELT LOOP ATTACHING MACHINE

56

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ABSTRACT

Apparel export industry is a most significant and a dynamic contributor for Sri Lankan economy. Among the different apparel products, trousers are a key product in most of garment factories. When considering the trouser belt loop, it takes a significant part of a trouser. There are two main belt loop attaching methods called patch loop and inserted loop. Some automated machines are already available for patch loop attaching process. But, inserted loop attaching process is done manually with two operators. Therefore, this process consumes some decent amount of time which in turn increases the total production time. In the other hand, most of the garment factories have a high labour turnover. Therefore, an automated machine would be the best solution to reduce operators and reduce total process time.

An initial work study is conducted at Brandix Casual Wear Ltd, which is one of the major apparel exporter in the country. According to the work study results, an automated machine is proposed to attaching inserted belt loop. The proposed design has three major modules namely loop preparing module, drag and holding module and placing module. Loop preparing module is a main part of the design and it used to cut the loop for given length, detect the loop joint and draw a mark on loop surface. Other two modules are used to place the prepared loop in to the sewing machine. The design and development of the loop preparing module is covered by this project.

Finally, a work study is conducted at the actual production line with the developed machine and it was found that, the machine is reduced the production time around 50% than existing manual process.

Keywords: Belt loops, Inserted loop, Belt loop setting system, Loop cutter, Loop feeder

Supervisor

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Abstract No: ME306

DESIGN AND DEVELOPMENT OF SEMI AUTOMATED SAND BLASTING MACHINE FOR SMALL SCALE INDUSTRY

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ABSTRACT

Sand blasting is one of the most important and frequently using methods in industry all over the world which directly affects small scale and large scale manufacturing industry such ship building, automobile parts and cleaning large structures. Sandblasting is the process of propelling sand at high speeds at an object to remove rust, paint, or other coatings. There are many safety issues and technical issues of conventional sand blasting method. In safety aspect such as the lung disease silicosis is caused by extended inhalation of the dust created by sand. In technical aspect some problems associated with local small scale industries such as difficult to handle small jobs, need more competent persons, cost for one part too much high etc. Generally existing methods are used for large scale industry, but there was no any suitable machine for small scale industry fulfils required conditions. Where semi-automated machine would be an acceptable solution. Therefore, this study was aimed to design such a machine for the use of small scale industry to reduce safety and technical issues associated with conventional methods.

The proposed machine has three major units namely, sand blasting cabin, sand storage and abrasive collecting tank. There are two nozzles at the inside of cabin. They are move up and down ward by using motors. Another main mechanism is mixing sand with compressed air. The inside abrasive sand is pushed from the sand inlet to the sand outlet and then the boosting air flow accelerates the abrasive sand. The accelerated abrasive sand is mixed with the boosting air and flows through the sandblast hose to the sandblast nozzle, then it is further accelerated to required speed. Finally the accelerated sand is shot to the work piece surface at a very high speed, by this way, the work piece surface is cleaned and strengthened. Sensors and actuators are used to operate the system components around cabin. A microcontroller based Arduino board was used to control the above sensors and actuators. This machine is very useful for the small scale industry and it overcomes safety and technical issues that identified in traditional machines. Also, it can reduce production cost, and human errors.

Keywords: Sand blasting, Lung disease silicosis, Small scale industry

Supervisor

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Abstract No: ME307

EXTRACTION ENERGY OF HIGHWAY

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130

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ABSTRACT

It is well known that air surge occurs in the highways due to movement of vehicles. This flow of air carries a significant amount of energy and could be harnessed for useful applications. Extraction of energy of wind is now an established technology and the same principles could be applied to harness kinetic and pressure energy of the roadside air surges. The possible direct application of energy thus extracted is highway logistic operations such as lighting, signal lights and similar digital applications. If excess energy exists, that could be transmitted to useful applications close to the highways such as house lighting etc.

Generation of clean energy to be utilized in present applications without environmental impacts and also meeting of continuously increasing demand for energy is a global challenge. This is especially a problem heavily felt in developing nations like Sri Lanka, as economic and human development. The extraction of energy from air surge is a suitable concept for highway street lighting. This project is aimed to develop a model for capturing energy content of air flows created due to vehicle movements in highways.

The main intention of this research is to provide a basic model which could further reduce cost of electrical energy consumption for street lighting in highways with environment friendly. In this project, actual air flow in highway is simulated by CFD (Computational Fluid Dynamics) solid works software, and also conducted a survey of actual air flow situations in highways in Colombo Katunayake expressway and collected necessary data. Then a model is developed for capturing wind energy on highways. By using this, turbine can be installed on high speed expressway, a considerable amount of electrical energy can be generated, which can solve the issue of energy crisis to a large extend.

Keywords: Wind energy, Turbine, Energy crisis, Energy from air surge

Supervisors

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Abstract No: ME308

DEVELOPMENT OF A CONTROLLER FOR ASSISTIVE DEVICES USING EYE MOVEMENT AND ELECTROENCEPHALOGRAPHY (EEG)

Page 59

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ABSTRACT

Assistive technology is adapted or specially designed technology for improving the functioning of people with disabilities. However, access to assistive technology is limited in Sri Lanka. The high cost of assistive technology development has put them out of reach of most of the disabled Sri Lankans. Therefore, development of a low-cost equipment to read signals from patients with limited abilities will be very useful. This research presents the development of a low-cost system which acquires and process brainwaves and eye movements of individuals. These signals are processed for controlling few assistive devices. Further, the research explores the methods for using the system in aids with the brain's ability to undergo plastic changes for the recovery of function and to ensure patient's safety. Experiments in this project revealed different ways of brainwave processing and meaningful brainwave output frequencies to identify more emotions and motives of human brain i.e. levels of concentration & drowsiness. The tests performed on different subjects, revealed many new useful results. i.e. more suitable position to place the electrode; variations in results when the subject gets familiar with the system. Circular Hough transformation based eye tracking system is developed to detect iris position. Initially, it is implemented in MATLAB to detect three iris positions i.e. left, right and center within 4-5 seconds. Later, the system is implemented for Raspberry-Pi using OpenCV and Python with less than 3 second detection time. Further, the ways to increase the efficiency of the low-cost system are explored by setting a common threshold for brainwave signals independent of user's age. This is explored using Fast Fourier Transformation and fuzzy logic. Finally, this research concludes that incorporating eye iris movement tracking in addition to brainwave variation based eye blink, concentration and drowsiness level detection from the patient can be used as a novel approach. This combination allows developing a simple real time assistive device controller. It has more functions at a lower cost than other available brain computer interface systems. This system can be used as a solution for connecting physically disabled individuals in developing countries to smart assistive devices.

Keywords: EEG, Brainwave, Eye movement tracking, Circular Hough transformation, Assistive technology

Supervisor

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Abstract No: ME309

LOW COST SEMI-AUTOMATED BELT-LOOP CUTTING MACHINE

Page 00

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ABSTRACT

Garment industry being a main economic sector in the country. Apparel and textile industry contributes 39% to the Sri Lankan industrial production and represents 43% of the country's total exports. It employs about 15% of the country's total workforce. Productivity fluctuation heavily depends on manual labour and their working environment. Labour shortage and increase of labour wages are the major problems and it tends to decrease profit margins, which is unexpected from the companies. There is a high demand for the garment products and foreign buyers seek the production with minimum lead time. Therefore, garment industries always try to increase the daily production. However, they have a critical problem of labour turnover.

As a solution, industries always try to replace some manual operations using any of method or machine. According to the factory visit and initial work studies, the helper operation of the belt-loop attaching process was identified as a suitable process to automate. This helper operator performs two operations that is belt-loop marking and belt-loop cutting operation.

The belt loop attaching process in the production line was studied and calculated the Standard Minutes Value (SMV) for each operation. According to that, the belt-loop cutting operation was identified to replace with automated machine. A semi-automated belt-loop cutting machine is developed to replace that manual operation. It is powered by electrical energy and no need pneumatic energy source as the available machines. Therefore, it is well suited for medium scale garment factories. The payback period of the machine is four months only. It is able to replaced one operator from every two production lines. Finally, it was found that accuracy and quality of the belt-loop produced by the machine is acceptable as the manual process.

Keywords: SMV, Garment, Automation, Production, Belt-loop

Abstract No: ME310

LOW COST AUTOMATED BAR

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FEEDER FOR POWER HACKSAW MACHINE

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ABSTRACT

Power hacksaw machines are commonly used in mechanical engineering workshops to cut material of various sizes and shapes in repetition. Even though the actual material cutting process is mechanized, loading and machine setup are manually performed and occupies a significant portion of the machine cycle time which would be not favourable in a high production scenario. High production capacity power hacksaw machines or similar are available but for small or medium scale workshops, it is not an economically feasible solution. Therefore the main focus of this project is to design suitable automated mechanisms to replace most of the manual tasks keeping the overall cost at affordable range for a small or medium scale industry/workshop.

By direct analysis of a metal bar cutting process utilizing the power hacksaw, it was found that more than 25% of the machine cycle time constitute of material loading, measuring and clamping operations. An automated mechanism based on work-piece loading, conveying and clamping in accordance to the user defined length was designed using low cost items confirming to structural and operational integrity. The only human intervention being, the loading of the work-piece (Metal-bar) on to the loading mechanism. The machine cycle repeats itself automatically once the cutting process completes for the pre-determined length. Practical tests confirms nearly 40% time saving in repetitive tasks. The mechanism could be adopted for any type of power hacksaw machine making the solution's versatility high. Additionally with few modifications, the mechanism could be also adopted to accommodate various shapes and sizes of work-piece material.

Keywords: Power hacksaw, Machine cycle time, Automation, Human intervention

Abstract No: ME311

EXPLOITATION OF ENERGY OF EXERCISE MACHINES

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ABSTRACT

The intent of this research is to draw attention to the energy wasted from stationary exercise machines used in gymnasiums and the methods of harnessing this energy. Mechanism and modules currently available for power generation off exercise machines were studied and analyzed. Possible methods of combining machines mechanically, in order to harness power are discussed and analyzed and their drawbacks are presented.

An alternative solution for harnessing wasted energy of exercise machine is by using a crank-slider and linear alternator. The conceptual design of the linear alternator was initially done using theoretical calculations.

Matlab simulation was used to simulate the velocity of the translator and COMSOL Multiphysics was used to simulate and optimize the design parameters of the conceptual design of the linear alternator.

The design parameters were finalized with respect to the required charging voltages of the lead acid battery. The electromagnetic force acting along the length of the translator was computed and the mass of the translator was determined. Thereby the total resistance to motion, of the linear alternator was calculated. Further simulations, on the ranges speeds of which the rider has to maintain in order to generate sufficient voltage to charge a 12V battery were carried out. The integrated mechanical and electrical components for charging the battery are presented. It was concluded that, on introducing this mechanism to harness power off exercise machines, 36% of power saving can be achieved for the gymnasium under consideration.

Keywords: Linear alternator, COMSOL multiphasic, Matlab

Supervisors

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Abstract No: ME312

DESIGN AND MODEL OF AN ADJUSTABLE EXCAVATOR BUCKET TO SATISFY THE INDUSTRIAL REQUIREMENT

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63

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ABSTRACT

The expectancy of this research project was to design and simulate an adjustable excavator bucket (clean-up bucket) for the mini wheel excavators. An excavator is a machine used for construction activities. The excavator consists of a house, undercarriage, boom, stick and bucket. The undercarriage has a motor and gears which aid in movement of the equipment. The house contains an engine, oil and fuel cylinders. The house connects to the under carriage through a cylindrical casket enabling it to revolve freely at a 360 degrees angle. A boom attaches to a stick which is used to lift the bucket. An excavator uses hydraulics or a wire rope pulley system to dig holes or trenches. Excavator has a long boom arm and a cab that is mounted on a pivot. These are used for digging trenches, holes and foundations and also used in forestry, digging rivers, heavy lifting, mining, material handling, driving piles and demolition. Digging trenches and foundations, become a problem as these are in different sizes and changing the buckets for the requirement is a problem. Changing bucket is not an easy work and it will take time. Also it can be damaged excavator bucket pin and shims.

The new design presented here is related to adjustable excavator bucket which can be used in construction sites. Normally excavators do not have adjustable buckets and the design is depend on the capacity of the machine and maximum load taken by the hydraulics jack of the bucket. In the most construction sites use the mini excavators for different purposes of the site requirements. This paper mainly focus on the design of the width adjustment of the excavator bucket by using finite element analysis. Therefore initially a literature survey was carried out to identify the different types of industrial requirements of excavator buckets, their sizes, types and applications. The adjustable bucket was modelled and analyse the design modelled by using finite element analysis, of the solidwork software. Total number of elements, type of solid elements and number of nodes were used for the simulation process. Simulation of the design based on the linear analysis stress, strain and displacement were analysed by including different types of boundary conditions under various loading conditions.

Keywords: Solid works, Finite element analysis

Supervisor

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Abstract No: ME313

NEURAL NETWORK BASED TRAFFIC LIGHT CONTROL SYSTEM

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ABSTRACT

Traffic controlling has become a global issue and as well as a major problem in Sri Lanka. The traffic congestion around Colombo city and its outskirts can be found often every time. Specifically at peak hours during the morning and evening. Due to heavy traffic congestion, the traffic accidents increased rapidly. Substantially, these cases could be found around junctions. At rush hours, the traffic officers control the long congested traffic, in order to minimize these incidents. In some junctions the traffic is controlled with the aid of colour lights. These traffic colour lights functions according to the data which has been already fed by the authority, but not with real-time congestion conditions. At very busy times like mentioned earlier these traffic lights will be controlled by the traffic officers, simply saying with the help of man power. Unfortunately these humans exposed to toxic gases, high temperatures and heavy rain falls. This implication actively affect to the other aspects of the country. The traditional traffic light controlling systems are based on timing controllers which are unable to provide intelligent predictions of the current traffic situation.

As a solution to above situations an optimistic suggestion of an intelligent traffic management system is proposed by this research. For analysis real time data was collected at junctions where traffic congestion is high during peak hours and data sets were fed to train a neural network developed for this project. System has three steps namely, data gathering, training, and the controlling. Vehicle densities within a certain time periods were taken in a range of 100m away from the junctions as main input data for sampling. The designed traffic control system was simulated by Matlab software and found to be functionally accurate. It shows this intelligent traffic light controlling system can be used for four way junctions to minimize traffic congestions. Further, a method of counting vehicles at junctions was developed using IR sensors to control the above system at real time operation. As a continued study, a prototype of a colour light system with four way junction was built and evaluated.

Keywords: Traffic control, Colour lights, Neural network

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Abstract No: ME314

INCREASING THE PRODUCTION CAPACITY OF D-BRACKET MANUFACTURING PROCESS

Page 65

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ABSTRACT

Mass production is manufacturing of goods in large quantities by using machines and techniques such as the assembly line and division of labour. D-Brackets manufacturing can be identified as mass production process. D-Bracket is a part of low tension insulator and hardware component. It produces using mild steel. It is used for connecting shackle/Spool insulator to poles and also for link fitting applications in 11/33 kV overhead lines.

This project was focused on using the combination press for the manufacturing process of D-Brackets. The press performs double lancing operations, which are shearing and punching on a single stroke of the press. Designing and fabrication of a press machine by combining shearing and punching processes were done.

Designing was done by using three dimensional modelling of the components, analysing stress and displacement on the components. The modelling and structural analysis of the components were carried out on Solid works 2012 and it was found to be acceptable. The design and selection of materials were carried out by following standards of press machine design approach and analysis method. This new machine can replace shearing machine and low capacity punching machine from the manufacturing process.

By introducing this double acting machine to the D-Bracket manufacturing process, it was reduced number of labours, manufacturing lead time and cost per D-Bracket. Thereby, production capacity per day of D-bracket manufacturing was increased.

Keywords: Low tension insulator, Combined press, Punching machine, Shearing machine, Stripping force

Supervisors

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Abstract No: TE301

A STUDY TO INVESTIGATION THE EFFECT OF THE VARIATION STITCH DENSITY AND SEWING THREADS ON SEAM PUCKERING

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ABSTRACT

Seam pucker is the most common problem in the making-up trade. It is a problem that also concern fabric finishers, sewing machine manufacturers and sewing thread manufacturers. This problem has been magnified with the introduction of new and unconventional fabrics and finishes. The common factors, which relate to seam pucker are the type of fabric yarns, construction of fabric, type of sewing machine, stitching conditions, sewing thread behavior etc. Practically it is very difficult to avoid seam pucker, because there is some buckling along the seam line. The visible effects of pucker can be reduced, but cannot be eliminated completely.

Seam puckering refers to the gathering of a seam during sewing, after sewing, or after laundering, causing an unacceptable seam appearance. Seam puckering is more common on woven fabrics than knits; and it is prominent on tightly woven fabrics.

The main objective of this research is to investigate the effects of varying stitch density and sewing thread size on seam puckering for the selected denim material. For the study three sizes of sewing threads having 30, 40 and 50 ticket numbers and ten stitch densities from 5 to 14 stitches per inch were used. The samples were prepared as per the standard testing method Indian Standard (IS 15312:2003). Fabric samples (five samples each for warp and weft directions for each stitch density) were prepared for ten different stitch densities from 5 to 14 stitches per inch by using the three selected sewing thread sizes. The total number of samples prepared was 300.

Those 300 samples were tested for seam puckering, the necessary data was collected and analyzed to determine whether the varying stitch densities and thread sizes has an impact on seam puckering. The values were obtained for each stitch density and for each thread size. It was observed that there are minor variations of the values, but these variations are negligible. Therefore for the selected stitch densities and for selected thread sizes, the tested material does not show the problem of seam puckering.

Keywords: Stitch density, Seam pucker, Ticket number, Threads size, Seam appearance

Supervisor

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Abstract No: TE302

INVESTIGATING THE EFFECT OF SELECTED HOUSE HOLD WASHING POWDERS ON SEAM STRENGTH OF SCHOOL UNIFORM MATERIAL

Page 67
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ABSTRACT

This study was conducted to find out the effect of selected house-hold washing powders on seam strength of school uniform materials. High percentage of school students uses white uniforms. Students generally use two or three school uniforms and they wash them frequently by using detergents. Due to this reason durability of uniform may be decreased. Seam strength is an important parameter, when deciding the performance of school uniforms.

The objectives of this research are to identify the common washing powders people use, to find out the seam strength property of school uniform material after number of washing cycles and find out the effect of the detergent type on the seam strength. A questionnaire survey was carried out to identify the most widely used three detergent types. For this research most common school uniform material 65% polyester and 35% cotton blended fabric were selected from the Sri Lankan market. For the seam construction sewing thread made of 100% spun polyester was selected.

According to the ASTM D 1683 – 04 specimens were prepared. 300 of warp direction specimens and 300 of weft direction specimens were used (each specimen size 4 inch×8.5 inch). The most common seam SSa-1 and 301 stitch type was selected for this study. 100 of warp direction specimens and 100 of weft direction specimens were washed with detergent type A. In the same way another 200 specimens were washed with detergent type B and another 200 of specimens were washed with detergent type C. The water was selected according to the Sri Lanka standards, SLS 614-2013. A front loading washing machine was used for washing. Each washing cycle was carried out with 30 minutes at 30°C temperature and dry at room temperature. ASTM D 5034-2008 testing method was used to find the seam strength of all specimens.

Keywords: Seam strength, Detergents, School uniform materials, Thread type, Seam allowance

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Abstract No: TE303

**DEVELOPING A DATA BASE & STANDARDIZE THE MOLDING PARAMETERS
FOR WIDELY USED FABRICS FOR THE FACTORY
BRANDIX LINGERIE (PVT) LTD**

89

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ABSTRACT

There is a high market demand for seamless or molded bras. Fashion industry has also given priority for molded bra designs. The most common practice is the try and error method to find suitable molding parameters.

The objectives of this research is to gather the details related to bra molding process and develop a suitable standard to find out suitable molding parameters for widely used fabric combinations of the selected factory. As the first step, the past records of six months were taken and analyzed to find out the most widely used fabric types. Then past records of twelve months were analyzed to find out the suitable range of parameters for different fabric combinations based on the fabric weight and the Elastane content. During the analysis it was found that Cotton/Elastane, Nylon/Elastane and Polyester/Elastane fabric combinations were most widely used fabric types in the factory. During the second analysis the most suitable range for molding parameters were identified for four molding parameters. They are male temperature, female temperature, dwell time and molding pressure. Due to various reasons, factory do not allow to change the molding pressure and dwell time.

After that the fabric using for future orders of six months were selected and categorized them by using the knowledge gained through previous analysis. Molding trials were performed by using the analyzed data for the selected fabric combinations. The main variable of this study was the molding temperature. After the trails it was found that most suitable molding temperatures for Cotton/Elastane fabrics is 175⁰C-185⁰C, for Nylon/Elastane fabrics is 190⁰C-200⁰C, and for Polyester/Elastane fabrics is 178⁰C-180⁰C. By using these ranges, it was possible determine the appropriate molding temperatures for different fabric combinations with fewer trials. It saves time, energy, material etc.

Keywords: Bra cups, Molding, Nylon, Elastane, standards

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Abstract No: TE304

**INVESTIGATING THE PATTERN OF CHANGING ORDER SIZES AND ITS
EFFECT ON RUNNING THE APPAREL BUSINESS
IN THE SELECTED FACTORIES**

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69

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ABSTRACT

The Global Textile Industry, particularly the apparel Industry has seen remarkable changes in the past few years. The garment manufacturing industry and the garment factories in developed countries are now always on a lookout for cheap source of garment production. The days are gone when textile garment industry was concentrated in the consumption hubs of US, EU and other developed countries of the world. The elimination of global export quotas has led to a shift towards low cost countries having strong and established clothing industry especially the Asian countries. Sri Lanka is one among those Asian countries.

The main objective of this research is to find out the pattern of changes in order sizes received by selected garment factories during the last four years, its effect on productivity and how these factories have faced the changes.

To carry out this study four leading garment manufacturing organizations were selected. The details of the order sizes were collected and analyzed for the years between 2013 and 2016. In addition to that the productivity data was also gathered and analyzed for the same period. After that, the counter actions taken by the factories towards the changes were studied. At the end, effectiveness of the implementation was studied.

The sizes of the orders have become smaller in all the selected garment factories, though the total order quantity has been increased. The productivity of the two factories has been reduced. One factory does not show any pattern of the changes of the productivity against the changes of order sizes. The productivity of the fourth factory does not show significant change against the changes of order sizes. These factories have taken various measures to face the situation depending on their capacity. Some have been successful, but the others not.

Keywords: Order sizes, Productivity, Quota, Export industry, Style changes

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Abstract No: TE305

EXAMINING THE RELATIONSHIP BETWEEN THE BIG FIVE PERSONALITY TRAITS AND JOB INVOLVEMENT IN THE SEWING SECTION OF THE FACTORY ABC

Page 70
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ABSTRACT

Job involvement has become a popular topic in the human resource management as well as the modern business context. Since the job involvement is an important factor to the organization, a survey study was carried out by using selected 30 participants of the selected factory to understand the level of job involvement in the sewing section. A questionnaire, which contained 10 questions, was used for the survey study. The results showed that there is lack of job involvement within the employees of the sewing section of the selected factory ABC. Therefore it was decided to carry out a comprehensive study to find out the level of job involvement by using the Big Five Personality traits. There are 665 of employees in the sewing section of the selected factory. As the sample for the comprehensive study, 248 employees were taken by using the stratified sampling method.

The necessary data was gathered through a self-administered structured questionnaire. Data was analyzed using correlation analysis by taking dependent variable as job involvement and independent variables as neuroticism, extraversion, and openness to experiences, conscientiousness, and agreeableness. They are the Big Five Personality Traits. The data was analyzed for correlation, by using SPSS 16.

The Cronbach's Alpha value was used to determine the reliability of the data between the job involvement and the Big Five Personality. According to the correlation analysis, the relationships between neuroticism, extraversion, openness to experiences, conscientiousness, and agreeableness against the job involvement was determined. It was revealed that extraversion, openness to experiences, conscientiousness, and agreeableness showed positive relationships with job involvement. Only neuroticism showed a negative relationship with job involvement of the organization. This knowledge can be used positively to enhance the job involvement of the employees of the selected factory.

Keywords: Neuroticism, Extraversion, Job involvement, Conscientiousness, Agreeableness

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Abstract No: TE306

INVESTIGATION OF FACTORS AFFECTING TO HIGHER ABSENTEEISM PERCENTAGE IN VOGUE TEX

Page 71
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ABSTRACT

This report consists of the detailed study of “Absenteeism of employees” of Vogue Tex (Pvt.) Ltd, Udukawa, Sri Lanaka. The aim of the study is to examine the antecedents of the “Absenteeism of employees in the production floor in sewing department of the company. Absenteeism is a serious workplace problem and an expensive occurrence for both employers and employees seemingly unpredictable in nature. Literature survey reveals that the average monthly absenteeism percentage in apparel industry in Sri Lanka is 7.4%. By collecting absenteeism data on past six months in Vogue Tex Udukawa it reveals that the average monthly absenteeism percentage is 11.08%.

This project discusses how the higher absenteeism of the employees of Vogue Tex (Pvt) Ltd, Udukawa influences on the production of the company. The major factors derived on the basis of the gathered data from the employees evidenced that the factors affect absenteeism are welfare facilities, salary, leave policies, supervisors’ behavior, working conditions and transport facilities provided by the company. Frequent production delays were observed and many mistakes and errors occur due to substituted employees for the absentees.

According to the study the orders received and delays of quantities due to absenteeism are significantly correlated which is shown by the R value. To overcome all those absenteeism problems, the management of the company should manage to provide better welfare facilities to the employees, increase salary according to their productivity rates, replace better leave policies, provide adequate training and improve supervisor’s behavior, improve the working conditions and provide enough transport facilities for needy employees.

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Abstract No: TE307

EFFECT OF VARIATION IN SEWING THREAD COUNT AND NEEDLE SIZE ON SEAM PROPERTIES OF 100% COTTON TWILL FABRICS

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ABSTRACT

In Garment Industry use different parameters for sewing process. This research study was carried out to investigate the effect of variation in sewing thread count and needle size on seam properties of 100% cotton twill fabrics. The seam properties of tensile strength, stiffness and seam puckering appearance were examined in the study. Generally, these properties are varying with fabric and stitching parameters. Tensile strength and stiffness mainly affect for garment functional and aesthetic performance of apparel. In this research, it was focused on sewing thread count, needle size, and seam direction and to weights of the similar fabric structure. The objective of this project is to find out the relationship between thread count and needle size with seam properties on seamed twill fabrics.

100% cotton twill 1/2 and 1/3 fabrics were used with three different sewn thread sizes (27, 40, 60 Tex), four different needle sizes (75/11, 90/14, 100/16, 110/18) and two directions of the seam (warp and weft). The weight per unit area of "A" fabric was 289g/m² and "B" fabric was 177g/m². The thickness of fabrics was 0.59mm and 0.27mm. Stitch type 301, lock stitch was used to prepare the plain seam. Total numbers of specimens studied in this research was 480. All the specimens prepared according to the ASTM Standards. And all specimens were tested for seam puckering, tensile strength, thickness and for stiffness.

The study revealed that the seam strength increase due to sewing thread size in both twill fabric structures. Further it revealed there is a relationship between seam stiffness in weft direction increases with the needle size. A high weight fabric shows higher stiffness. Low weight fabric with thread count 60 Tex shows a relationship with the needle size and seam puckering. Seams puckering inversely related to needle size. The results were confirmed using regression analysis with 95% level of significant.

Supervisor

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Abstract No: TE308

**TO PRODUCE CLADDINGS AND PARTITION BOARDS USING INDURU FIBRE
(HANGUANA MALAYANA)**

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73

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ABSTRACT

The manufacturing of claddings and partition boards is a blooming industry. On the other hand claddings have become one of the most popular alternatives for renovating the exterior of existing buildings. This solution gives a building a new look, new life and will generate saving electricity when thermal and insulation issues are addressed. Cladding benefits are greatest when dealing with high story buildings, or buildings confined in a small site, where the demolishing process is almost impossible and not feasible.

Throughout this project discusses the possibility of ways for using Hanguana malayana fibre in producing claddings and partition boards. The scope covers the retting methods of Hanguana malayana, properties of the fibres, bleaching and dyeing of the fibers, how to make composite and its properties.

There are so many claddings and partition boards used and also using in the present, such as plywood boards, asbestos, wood, metal, glass etc. This can be used to replacing those materials.

The fibres are having good tensile strength, moisture content and moisture regain is low comparing with cotton, able to be dye without bleaching etc. The composite is having good workability factors, impact strength, tensile strength and low water absorbency properties. When comparing with cotton MC and MR properties are very low.

These fibres can be mixed with glass fibres due to the moisture properties it consists. During fibre extraction process Hanguana malayna produces a dark red colour liquid. Sometimes this liquid can be even using to develop a natural dye. Hanguana malayana fibres are having low moisture content and moisture regain property. So it is suitable for making paper products as well. These fibres can be mixed with glass fibres due to the moisture properties it consists.

Supervisor

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Abstract No: TE309

**EXTRACTION OF NATURAL DYES FROM THE STEM BARKS OF GAN SURIYA
(THESPIESIA POPULNEA) AND MAILA (BAUHINIA RACEMOSA)**

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ABSTRACT

The study was carried out to find out the usage of plant sources to extract natural dyes for textiles. It is focused on the stem barks taken from two commonly available trees in Sri Lanka as sources. The selected trees are Gan Suriya (*Thespesia populnea*) and Maila (*Bauhinia racemosa*). Gan Suriya is an evergreen perennial tree belongs to Malvaceae family which is distributed in many areas. Maila is a deciduous tree grown in dry areas which belongs to the Fabaceae family. In the present study, dyes were extracted from the dried cut bark chips using aqueous extraction method. To analyze the best colour yield, extraction was done at different pH conditions, different temperatures and different time periods. According to the experiments, it was found that the best colour yield can be achieved by the alkaline extraction at temperatures close to the 100^oC and a period over 30 minutes. Using the results, extracted dye liquors were used to dye desized and bleached cotton fabrics. Dyeing was carried out by pre mordanting method, using commercially available three metal salt mordents namely as copper sulphate, ferrous sulphate and alum and one natural mordant such as Sepalika flowers. Different shades were obtained by different mordants. Experiments were done to find out the optimum dyeing time and optimum dye steeping time. To evaluate the dye affinity at different pH values, the pH of the dye liquor was adjusted to alkaline and acidic states during dyeing. Results were assessed using a colour assessment cabinet and grey scales for assessing staining. The staining differences were least between different dyeing periods. Deep shades were obtained by steeping the samples in dye liquor over 6 hours after dyeing and increasing the alkalinity of the dye liquor during dyeing. To assess the fastness properties of the extracted dyes, fastness tests for light and washing were carried out. Light fastness test was done using the light fastness tester. Mordanted and non mordanted dyed samples were exposed to the UV light until the standard sample is faded to grade 3 according to the grey scale. Washing was done using the beaker dyeing machine over 45 minutes at 50^oC. Colour fading of dyed samples due to both light and washing was assessed by using grey scales for assessing change in colour. According to the results obtained, wash fastness of both the dyes was improved by the mordants and the light fastness of both the dyes was moderate even after mordanting. Herbal characteristics of Gan Suriya bark as a medicine against skin infections, eczema etc. is confirmed. The dye extrudate from Gan Suriya and Maila have been confirmed as suitable for dyeing cellulose based fabrics.

Supervisor

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Abstract No: TE310

DEVELOPING NATURAL FIBRE REINFORCED CONCRETE COMPOSITE BY USING KITUL PALM FIBRE

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ABSTRACT

Kitul palm is a native rain forest species of tropical Asia with economic value. This tree provides a natural bast fibre resource. In this research the microscopic view, diameter, length, tensile properties, elongation, moisture regain and moisture content of the fibres were studied. By using the Kitul palm fibres a novel value added product Kitul fibre Reinforced Concrete Composite was developed.

The mix designed with mortar reinforcing with Kitul fibre to develop concrete composite by adding fibres of 0.5%, 1% and 1.5% by weight. The cubic compressive strength and workability of the mix designs were investigated. By analysing the compressive strength of the mix design of 1% fibre content gave outstanding results. The cost of the 1% mix design is analysed and compared with Grade 30 conventional concrete.

The properties of the fibre discovered as the diameter 0.85mm, length 65cm, breaking force 35.6 elongation 45.2%, moisture regain 16.1%, and moisture content 14%. The fibres are black coloured with oval shape cross sectional view and cylindrical longitudinal view. In the present work Kitul fibre reinforced concrete composite was developed by the standard BS 5328 with mix ratio of Grade 20 concrete. Mix designs of 0.5%, 1% and 1.5% showed the compressive strength properties in respect of 22.5 Nmm⁻², 30.5 Nmm⁻², 28.4Nmm⁻².

In this research it is identified the mix design of 1% of fibre is suitable for Industrial constructions as it showed compressive strength increase of 10 Nmm⁻² than plain Grade 20 concrete. The cost analysis with conventional concrete showed 13.89% of cost reduction per 1m³. The Kitul fibre reinforced concrete composite can use as a substitute for steel, asbestos, glass and synthetic fibre reinforce concrete composites. This is also can use for sustainable developments with reduced environmental and health hazards. In the industrial constructions Kitul fibre reinforced concrete composite can use to build low cost constructions.

Supervisors

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Keywords: Kitul fibre, Fibre reinforced concrete, Composite, Compressive strength, Mix designs

Abstract No: TE311

Page 76 **DEVELOPING NATURAL DYES FROM SRI LANKAN PLANTS**

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ABSTRACT

Sri Lanka is a tropical country. Banana is one type of tropical tree. Actually Banana trees are easily growing in Sri Lanka. Presently Banana trees are growing for fruit purpose. Banana stem part has good dye extraction. It is really more suitable for cellulosic fibers. With same recipe can dye different cellulosic fabrics to get same color. Kothala Hmbutu is another type of tropical hardwood. It is presently using to medical purpose. But its stem part has very good dye extraction for cotton dyeing and to other cellulosic fabrics.

Banana extraction get using grinder to remove the dye molecules from stem parts. Kothala Hmbutu extraction is got, stem parts were boiled with water. The researcher was developed more recipes for these two dye types. To make a final recipe, the researcher was selected suitable conditions for selected color. So the researcher was proceeded the project work with some experiments. Those were changing pH value of dye bath, Changing Temperature, Changing Dyeing time, changing alum weight, Changing Dye extraction's concentration.

According to above experiments the researcher was selected the suitable color with suitable conditions. Finally make the recipe and according to recipe dyed the cotton fabric and dyed fabric referred to color fastness tests. To test the color stability of dyed fabric the researcher was done ISO 105X12 (color fastness to Rubbing), ISO 105-E01 (Color Fastness to water), ISO 105 C06 (Color fastness to accelerated laundering).

After those tests, dyed fabric with Banana was passed and dyed fabric with kothala himbutu was failed. Finally, the researcher was selected the best dye type for cellulosic fiber. It was the Banana stem natural dye. Final color is match with standard color type Pantone-14-0936 TC and using spectro - photo meter got the color value, under d65 Day light source. (Red- 0.0208, Yellow- 0.0989, Blue- 0.0232)

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Abstract No: TE312

DEVELOPING SANITARY NAPKINS FROM CORNHUSK FIBRES

Page 7

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ABSTRACT

Corn is the second largest agricultural crop grown in the world. Cultivation of corn generates biomass such as stalk, leaves and husk as by products. The tampon and pad industry is a huge market. They are mass-produced, heavily marketed and cheaply made out of bleached rayon and plastics. Almost all sanitary napkins and tampons are made of bleached rayon, cotton and plastics. These products leave behind fibres that can cause bladder and vaginal infections, along with Toxic Shock Syndrome. In that case trying to produce a sanitary napkin with interior layers of cotton and cornhusk will be a better solution to the problems currently can be seen in the society since using tampons and sanitary napkins made out of manmade fibres and long exposure to them may lead to nausea, vomiting, chest pain, headaches, breast cancer, endometriosis, immune system suppression and various other ailments.

Corn fibres can be extracted from the cornhusk by several means of such as dew retting, stagnant water retting, and slow moving water retting and heating with different percentages of NaOH concentrations. It has average moisture content (ASTM D2495 – 07) of 7.221% and average moisture regain of 7.787. Under the microscopic view, the cross-sectional view is heavily porous, which is capable of retaining more water and liquids. This napkin is made of using a bottom polyethylene layer, a cotton layer on top of that, the non-woven web and again a thinner cotton layer and on top a nonwoven absorbent layer as in the market products or using a pure cotton material rather than that. According to the tests carried out, (SLS111:2009) regarding the growth of the microorganisms, the aerobic plate count is 920 and it is in an accepted level as per the standard and the absorption of liquids is satisfied and the pH value is 6.1 which is also accepted.

Supervisor

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Abstract No: TE313

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TO DEVELOP CEMENT COMPOSITES USING BANANA FIBER

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ABSTRACT

This study has been carried out to develop value added products from freely available waste banana stem fibres. Researcher has extracted fibres from common banana varieties freely available in Sri Lanka. Usually this biomass is destroyed and allow for degradation in the farmlands itself. Researcher has collected literature regarding fibre properties, end uses, production methods and available machinery. Banana fibre is biodegradable and has no negative effect on environment hence categorized as eco-friendly. In this study researcher has developed cement composites and evaluate their physical properties to optimize them. Cost is the major disadvantage with regarding concrete reinforcing with metal. Concrete has a similarly wide and varied range in industrial applications. According to literature major requirement for the concrete cubes quality is compressive strength. The compressive strength of any material is described like the defiance to failure under the operation of compressive forces. Compressive strength is considered as the vital element to detect the operational activity of the material, specifically for concrete throughout service conditions. The compression strength testing of samples were done at National Engineering Research & Development Centre, Ekala, Jaela. Compressive strength of cement is determined by compressive strength test on mortar cubes compacted by means of a standard vibration machine. Cement and sand were used for the preparation of cement mortar. The specimen is in the form of cubes 15cm×15cm×15cm. After 7 days, it was randomly mixed banana fibre concrete sample had the highest compressive strength value. According to the researcher's observations the banana fiber percentage the strength increases up to 0.5% of its weight when the increasing. If further increased its compressive strength is again decreased. According to the compressive strength test reinforced blocks with randomly distributed natural banana fibres yielded higher compressive strength results compared to the unreinforced blocks, crosswise layering blocks, and lengthwise layering blocks. So the researcher has prepared random mixing banana fibre concrete blocks and kept 28 days testing the breaking load. 'Seeni' banana sample had the highest estimated tensile strength out of various treated samples; 5% NaOH treatment further increase the strength. Although banana fibre has necessary strength it has high coefficient of variation. It was found that Seeni banana layer 01, 02 are the most suitable to prepare fibre composite. It was proven that the banana cement composite saves material yields cost as well as reinforcing the cement

Supervisor

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cubes. The material saving without affecting their strength and quality is 10.036% of the cube volume.

Abstract No: TE314

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DEVELOPING ROOFING SHEETS USING PALMYRA FIBERS

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ABSTRACT

In august 2015 Sri Lanka's president have said the government may ban asbestos roofing sheets in 2017 as it is generating health issues to the users. World Health Organization was said that all the types of asbestos cause lung cancer, cancer of the larynx and ovary. According to below reason, developing roofing sheets with Palmyra fibers will be a beneficial project. Indian scientists have developed hybrid composites using Palmyra waste fibers. Were made Palmyra fibers taken from the leaf sheath are used to produce cleaning brushes in Sri Lankan.

The Palmyra tree traditionally has been the most important tree because it's every part of the tree can be used for some purpose. There are two types of fibers can be extracted from Palmyra leaves. These two types of Palmyra fibers are seperated from the stalk of the leaf. One type of fiber were getting stalk and other one was getting leaf sheath. Palmyra stalk fiber average breaking force was 23.04N and Palmyra leaf sheath fiber average breaking force was 41.30N and Palmyra stalk fiber average of elongation was 5.97% and Palmyra leaf sheath fiber average of elongation was 5.49% and Palmyra stalk fiber moisture regain was 6.55% and Palmyra leaf sheath fiber moisture regain was 5.26%.. According to this result, I were selected Palmyra stalk fiber.

Palmyra stalk fiber extraction process were removed the peel of the stalk and beating, retting and combing. Resin system is used to provide the rigidity and to hold the textile material at the prescribed position in the composites. Polyester resins are easy to work and low cost. Fibers cut into various sizes and fibers arrange in random orientation and 110mm x 100mm x 4mm of composite made by compression molding techniques. Develop different composite by changing weight of fiber content and cement weight. Checked the flexural strength and selected the best composites. The flexural strength 3 point bend testing of sample were done at Fiber science

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engineering department, Moratuwa University, Moratuwa. And then were selected what is the best composite and finally made roofing sheets according to suitable composite.

Abstract No: TE315

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JAZZY CREEPER-INTEGRATION OF FUTURISM AND HISTORICISM

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ABSTRACT

The concept of 'Jazzy Creeper' explores a fusion of past and future: the fantasy world of surreal animal textures and the classic looks of the 50's and 60's. The Rainbow chameleon is a distinctive, well known reptile, owing to a combination of its large eyes, curled tail and chromatic colors that change as a response to its mood or climate. Inspired by the skin of the rainbow chameleon, futuristic surface developments have been contrived and translated into print. Staying in line with my selected brand, I have also been inspired by the retro silhouettes of the 50's and 60's. The resulting collection is an amalgamation of what was, and what is to come - the classic, retro looks of the 50's and 60 are embellished by the contrived visual textures of the chameleon skin.

Burberry, a brand synonymous with British luxury, was brought to life by a 21-year old draper's apprentice, Thomas Burberry. Burberry Prorsum, now known as 'Burberry Runway', is the brand's haute couture line. It is known for its sheer luxury, classic British sophistication and elegance, coupled with unparalleled class and quality.

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My collection will target the fashion elite - 20 to 35 year old women living and working in London. The collection falls under the dressy casual category, giving a semi-formal look. The identified market gap suggested the collection should be pitched to a younger customer, in hope of creating a sense of brand loyalty in a younger demographic. The silhouettes are inspired from the 50's and 60's. Style features include balloon shapes, bodycon dresses, trapeze lines, A-lines, tunics, bell sleeves, wide collars, gigantic buttons and swing lines. The Jazzy creeper is a blend of the old and new; a classic collection beautified by futuristic, contrived animals' skins which invite the observer to step into a fantasy world of unreal animals where colours and textures are wild and exuberant.

Abstract No: TE316

SS 2016/2017 - WOMEN'S STREET WEAR COLLECTION INSPIRING FROM YOUTH REBELLION

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ABSTRACT

'Irregular', a collection of women's streetwear under the Japanese label, 'Motonari Ono'. Developed under the concept of youth rebellion, It discusses the radical feelings of youth, rebelling against the unfairness of the government and has been inspired by a violent state of mind and the painful experiences revolving around rebellions and protests.

Streetwear is a distinctive style of street fashion. Rooted in Californian surf and skate culture, it has grown to encompass elements of hip hop fashion, Japanese street fashion, and modern haute couture fashion. As with many grassroots cultural movements, streetwear has been notoriously difficult to define. Street wear can be divided into many categories such as grunge, hip hop, punk, hippie, hipster, feminine, teddy boy, skinhead, rasta, urban and gothic. From these, hipsters have been selected as the target market segment.

Japanese hipsters can be defined as independent thinkers, embracing counter – culture, progressive politics, art and indie rock. They are educated and have a distinct sense of fashion. Tokyo has large numbers of hipsters. They represent one of the city's biggest youth subcultures. A good fraction of Tokyo hipsters are foreign residents of Japan. Hipsters from around the globe are attracted to Tokyo.

Supervisor

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The project involved a lot of pattern making and new silhouettes have been generated using deconstructed. Just like the rebellious youth, the style features are out of the ordinary and spontaneous. The fabric surfaces have been hand printed and hand dyed- techniques that bring out the spontaneity and freedom of the youth movement.

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MYSTICAL TRANCE - A COLLECTION OF GRAPHIC PRINTS INSPIRED BY DOODLE ART

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ABSTRACT

Communication has existed in various forms since man appeared on Earth. The methods of communication, the way of expressing ideas and feelings may have had different meanings to each human using them. Eventually, communication began to take on an intentional, structured format. The most well-known form of primitive communication is scribbling patterns of signs and paintings using natural pigments made from the juice of fruits and berries, minerals or animal blood. This was the stage that scribbled patterns started to evolve into doodle drawings. Ancient people started to find various ways to expand the range of their methods of communication. They started to make drawings with more details or with representational meanings instead of simple scribbling like they used to before. Most of these drawings were like signs of letters, languages or colourful drawings that ancient humans found in their day-to-day life. My inspiration for this project is an art genre that has very simple drawings that can have concrete representational meaning or may just be abstract shapes. On the surface, 'doodle art' may appear to be an aimless style of art, but has behind it a rich historical background. It may date back to 30,000 B.C and done by ancient species of man for the basic purpose of communication. The modern form of scribbling, 'doodle art' can be rightly called a global craze, owing to its modern aesthetic. There are doodle arts inspired by different art genres such

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as abstract, graffiti, and graphic, but just like in the ancient era, the unique feature of doodle art is not having a particular formula or pattern that one needs to adhere to. Doodle art will always reflect the feel of its creator. After further research on the selected inspiration, I developed my own range of doodle concepts that enhanced the sense and the mood of my project. I used random placements of ink drops, random lines and shapes, repetitive patterns, scaling in and out and filling spaces are some of the techniques of doodle art that I used to develop my concept developments. I was inspired from the features of ancient cave arts and used to develop my creations with the touch of modern doodle art influences. Colours are one of main elements that helped me to maintain the sense of this project. In my colour pallet there were two shades of red, two shades of gray, white and black that seems very close to natural pigments and dyes of ancient cave art drawings. The main outcome of the design development process is a range of graphic prints for my final garment collection. I developed my hand illustrations into applicable print developments using various software which have been printed on fabrics using the sublimation print technique.



Abstract No: TE318

THE EFFECT OF PHYSIOLOGICAL CONTRACTS VIOLATION ON VOLUNTARY LABOUR TURNOVER

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ABSTRACT

Apparel industry is the key industry in Sri Lankan economy system. High rate of labour turnover and lack of labour to fill the vacancies is a problem in the Garment Industry. This study was carried out to evaluate the psychological contract violation on voluntary labour turnover in the garment factories in the Katunayake Industrial Promotional Zone in Sri Lanka.

The survey was conducted among two sample groups, current and ex-employees of garment factories. The primary data was collected through a questionnaire survey using a sample of fifty machine operators who work in the Katunayake Industrial Promotional Zone, selected convenient basis. A separate questionnaire was given to the other members of the staff to see the managerial side. Secondary data was collected from the ex-employees through interviews.

This study evaluates on five factors; salary, work load, work life balance, promotional opportunities and social reputation which also depends on the demographic factors such as age, marital status, distance, and the service period. The data collected were analyzed in a qualitative manner using Semantic Differential analysis which is used to measure attitudes. The results revealed that the above factors are the causes for psychological contract violation which is positively related to the intention of voluntary turnover. Increase the salary levels, a friendly work environment, adequate training period, provide promotional opportunities, provide facilities to continue their higher studies, introduce skill based incentive schemes, and a strong human resource department are the recommendations to mitigate the problem.

Keywords: Voluntary Labour Turnover, Psychological Contract Violation, Garment Industry, Semantic Differential analysis.

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Abstract No: TE319

EFFECT OF PLAIN SEAM PARAMETERS ON DRAPING BEHAVIOR OF 100% COTTON WOVEN FABRICS

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ABSTRACT

Drape is an important property that decides the gracefulness of any garment. Draping behavior influences on the aesthetic appearance and functionally of fabrics. Seaming changes, the draping behavior of fabrics in garments and it depends on the seam and stitching parameters. This research work focused on the effect of stitching and seam parameters such as stitch density, sewing thread ticket number and seam allowance on the draping behavior on 100% cotton fabrics seamed with plain seams. For this research, 100% cotton fabrics with 54 warp/ inch, 37 weft/inch and 86g/m² have used. During the experimental, needle size of 14, 100% spun polyester with three industrially used sewing thread ticket numbers (TN) such as 50, 75 and 120(used for both needle and bobbin threads), four seam allowances (SA) such as 4mm, 6mm, 10mm and 14mm, three stitch densities (SD) such 10, 12 and 14 stitches/inch, fixed sewing machine speed were used in making plain seams with stitch type 301. To investigate the draping behavior of seamed samples with the above given variables, standard Cusick 3D drape meter was used according to the standard procedure and data have taken as drape coefficient(DC). Drape coefficient is a ratio of a projected pleating fold area formed by a piece of fabric after draping under its own weight to the original area of this piece of fabric without draping. DC was calculated using following standard formula. Drape coefficient(DC)= the ratio between the mass of the paper ring after draping the fabric sample and the mass of the original paper ring before drape the fabric sample. It is a well-known fact that fabric drapability is inversely proportionate to the DC. Therefore, The higher the fabric drape coefficient (DC), the lower the fabric drapability. First the results were obtained for the variations of DC with the TNs of sewing threads under the three different SDs separately for four SAs. Based on the ANOVA analysis done 95% confidence level, it was found that TN is not significantly affected on DC ($F= 0.77, 3.11, 5.05, 3.23; F_{0.05}=5.14$). Secondly, the results were obtained for the variations of DC for the effect of SDs under three TNs for the three SAs. Based on the ANOVA results done 95% confidence level, it was found the DC does not significantly affect by SDs ($F= 0.22, 0.56, 1.06; F_{0.05}=4.10$). Finally, the result were obtained for the variations of DC with the three TNs. Based on the ANOVA analysis done under 95% confidence level, it was found the SAs can give highly significant effect on fabric drapability ($F=31.83, 12.59, 23.55; F_{0.05}=3.86$) According to the ANOVA analysis results, it can be concluded that sewing thread ticket number and stitch density do not give significant effect on the fabric drapability. But, seam allowance gives higher significant effect on the draping behavior of seamed fabrics.

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Abstract No: TE320

STUDY ON INFLUENCE OF CLOTH COVER FACTOR ON THE COLOR MEASUREMENTS OF DYED 100% COTTON WOVEN PLAIN FABRICS

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ABSTRACT

Colour variations due to the structural parameters of fabrics is one of the main problems faced by the fabric dyers in the industry. When, the recipe, which is known for the reference fabric, is applied for the fabrics with various structural parameters such as warp and weft density and yarn count, colour effect is changed significantly. Therefore, the aim of the research was to determine the influence of cloth cover factor for the color values of 100% cotton fabrics for reactive and vat dyes. Cloth cover factor is used as one variable factor in this research, because, cloth cover factor is a resultant effect of both yarn counts and warp and weft densities. Thus, reactive and vat dyes are used here, because, these dyes that are widely used for dyeing of 100% cotton plain fabrics in the industry. For the experimental works, there are nine 100% cotton fabrics have produced using the weft densities as 30, 40 and 50 (picks/inch) and the weft yarn counts as 10, 20 and 40 Ne. Due to the practical problems, warp density and warp yarn count have used as fixed parameters. Then, cloth cover factor was calculated using the standard formula using above variables. For dyeing the 100% cotton fabrics reactive (R) and vat (V) dyes have used with standard recipes and fabrics have dyed in red, blue and yellow colours, as they are primary colours. Fabric samples were tested by using spectrophotometer and L, a, b color values were measured. Variations of Lightness, Chroma and hue due to the changing of cloth cover factor were given by measures L, a and b data from spectrometer. Total colour difference has calculated using the formula: $\Delta E = [\Delta L^2 + \Delta a^2 + \Delta b^2]^{1/2}$. Based on the results, it was found that L values increased with the cloth cover factor. As a theory, "L" increasing means, colour shade becomes lighter. But, "a" and "b" values given by the test results showed that they gradually decreased with increasing the fabric cover factor. As we know, when a value decreases the colour of the fabric becomes green and with decreasing b values, fabric colour becomes blue. Therefore, it was proven that cloth cover factor plays a significant role and can give variations in colour depth and shade of fabric samples, if they are dyes with same dye recipe. Further, it was obtained the regression correlations for "L" values (Y) with the cloth cover factors (X) for yellow, red and blue reactive dyes respectively as $Y = 0.0571x + 86.61$ ($R^2 = 0.4802$), $Y = 0.1911x + 58.00$ ($R^2 = 0.7413$), $Y = 0.1829x + 59.89$ ($R^2 = 0.5051$) and the same as for the vat dyes as $Y = 0.3816x + 53.29$, $Y = 0.2104x + 35.87$ ($R^2 = 0.8261$), $Y = 0.0571x + 86.61$ ($R^2 = 0.5583$), $Y = 0.2207x + 18.54$ ($R^2 = 0.7245$). Then, it was obtained the regression correlations for the variations of "a" values (Y) with the cloth cover factors (X) for yellow, red and blue reactive dyes respectively as $Y = -0.078x - 5.93$ ($R^2 = 0.8700$), $Y = -0.2411x + 49.21$ ($R^2 = 0.9154$), $Y = -0.0193x - 4.024$ ($R^2 = 0.5453$) and the same as for the vat dyes as $Y = -0.1401x + 29.70$ ($R^2 = 0.7459$), $Y = -0.0626x + 43.47$ ($R^2 = 0.7613$), $Y = -0.0244x + 3.39$ ($R^2 = 0.6601$). Further, the variations of "b" values have also taken and the regression correlations for the variations of "a" values (Y) with the cloth cover factors (X) for yellow, red and blue reactive dyes respectively as $Y = -0.2479x + 81.02$ ($R^2 = 0.5336$), $Y = -0.1873x - 4.68$ ($R^2 = 0.7112$), $Y = -0.1499x - 16.54$ ($R^2 = 0.5609$) and the same as for the vat dyes as $Y = -0.1211x + 58.45$ ($R^2 = 0.6503$), $Y = -0.0963x + 1.54$ ($R^2 = 0.7315$), $Y = -0.0963x + 1.54$ ($R^2 = 0.8435$). It also observed that some regression correlations were very strong and some were at middle range. Based on the results and analysis done, it can be concluded that colour depth and shade of a dyed fabric becomes lighter, move towards green and blues colours, when the cloth cover factor increases. Therefore, it could be proven that cloth factor can give very significant role on fabric colour depth and shade, if the same recipe is used for dyeing the same fabrics with different cloth cover factors. Fabric dyers have to select proper warp and weft densities to represent the suitable cloth cover factor to obtain the correct colour shade.

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