10TH INTERNATIONAL RESEARCH CONFERENCE

3rd and 4th August 2017

'Changing Dynamics in the Global Environment: Challenges and Opportunities'

ABSTRACTS

General Sir John Kotelawala Defence University Sri Lanka

Ratmalana 10390
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Message from the Chief Guest

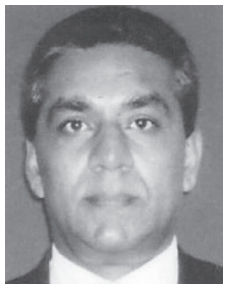
I am pleased to send this message to the Abstract Book of the International Research Conference-2017 of General Sir John Kotelawala Defence University, Sri Lanka, especially on the occasion that it is held for the 10th consecutive time. Research, experiment and invention have been in existence ever since the presence of man on this planet, and it has been brought into a whole new level and caliber in the 21st century, which can be witnessed in the pro-research environments and research conferences of this nature promoted and held by universities around the world. In this milieu, KDU-IRC, I believe, has become predominant in providing a collective platform for both civil and military specialists to engage in multidisciplinary discussions while showcasing new discoveries related to multiple disciplines.

I firmly believe that, this year's conference theme Changing Dynamics in the Global Environment, is both timely and appropriate for local as well as foreign scholars to display and gain recognition for their research achievements. Also worth mentioning is the importance of such collaborative multidisciplinary research which will ultimately pave path for inculcating professionalism, boosting international relations and nation-building, which, I presume, is undoubtedly one of the aims of KDU-IRC as well.

Finally, while congratulating and appreciating the work done thus far by Kotelawala Defence University in general and the conference organizers in particular, I wish all the success for the 10th International Research Conference of KDU.

HON SUSIL PREMAJAYANTHA
Minister
Ministry of Science, Technology and Research

Message from the Secretary Ministry of Defence



It is a pleasure for me to send this message to the International Research Conference 2017 of General Sir John Kotelawala Defence University (KDU) in my capacity as the Secretary to the Ministry of Defence and the Chairman of the Board of Management of KDU.

It is well-known that Kotelawala Defence University has been rendering a yeoman service in the field of defence education catering to the requirement of producing graduate officers for the tri-services in Sri Lanka, and today it has grown in strength to extend its high quality, tertiary level, English medium education for Sri Lankan youth as well as for foreign students. In this context, it is heartening to see that it is also playing a leading role in the field of multi disciplinary research, and I am sure that the tenth anniversary research conference on the theme, "Changing Dynamics in the Global Environment: Challenges and Opportunities", would provide a sound platform to discuss with highest intellectual and philosophical depth on diverse issues in the dynamic world we are living today, particularly with a view to opening new avenues for solving our problems.

I take this opportunity to congratulate the Vice Chancellor and KDU staff on organising this important event and also to commend the researchers who took it upon themselves to make a valuable contribution to the knowledge bases of their respective disciplines, particularly in Defence and Strategic Studies. I wish the participants of this International Research Conference an intellectually fulfilling experience.

KAPILA WAIDYARATNE PC
Secretary
Ministry of Defence

Message from the Vice Chancellor

It is with great pride and pleasure that I pen this message for the Abstract Book of the International Research Conference of General Sir John Kotelawala Defence University, Sri Lanka (KDU-IRC), especially at this symbolic moment when it is held for the 10th consecutive time. Over the past decade, KDU-IRC has made its distinct mark in the arena of multi-disciplinary research both nationally and internationally. This is certainly a matter that cannot be ignored; it gives me immense pride in reminiscence, especially as we celebrate KDU-IRC's 10th anniversary, and I am humbled to be at its helm.

Today, KDU-IRC has attracted specialists in diverse fields across the globe, enriching and encouraging its multi disciplinary space in the field of research and in the practice of knowledge dissemination. This year's conference under the theme Changing Dynamics in the Global Environment gathers experts both local and foreign under various disciplines, including defence and strategic studies. In particular, we are proud to have internationally eminent, Sri Lankan born scientists such as Prof. Chandra Wickramasinghe and Dr. Bandula Wijay with us this time as they have made our motherland proud in the international arena as renowned experts and intellectuals in their respective domains.

KDU-IRC stands strong today with the great withstanding support of KDU staff and its well-wishers. I am especially thankful to the Ministry of Science, Technology and Research and the National Science Foundation, not forgetting the Ministry of Defence for their unfailing support in co-organising this conference.

It is my sincere wish that the plenary sessions, pre/post-conference workshops, and oral and poster presentations, which will unfold during the course of these significant days, will generate productive discussion and constructive criticism and will instigate thought for development in future. I hope that many would make KDU-IRC events an opportunity to study the changing dynamics in the socio-cultural environment in Sri Lanka, and help place our nation high, driving it towards success in the global matrix.

REAR ADMIRAL JAGATH RANASINGHE USP, psc
MSc(DS)Mgt, MMaritimePol(Aus), PG Dip in CPS, Dip in CR, AFNI(Lond)
Vice Chancellor

Message from the Conferenc Chair

It is with great pride that I write this message as the Chair of 10th International Research Conference of General Sir John Kotelawala Defence University (KDU IRC), in this exciting time in KDU history.

For a decade KDU IRC has been a platform for knowledge sharing among researchers of various backgrounds. In this special year on its 10th anniversary, KDU IRC has invited over 50 experts from world over to share their knowledge and to initiate collaborations with their local counterparts numbering well over 1000.

KDU IRC received 557 research papers this year. Out of which 365 has been selected through a double blind peer review process for presentation. I, therefore, have no doubt that the outcomes of the conference would not only bring pride to KDU, but also uplift the status-quo of research and development of the country as a whole.

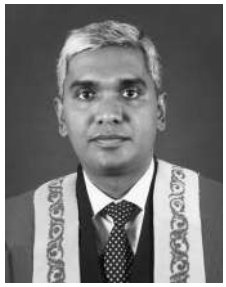
My task as the Chair this year would have been laborious, if not for the guidance, assistance and most of all the freedom given to me by the Vice Chancellor, Rear Admiral JJ Ranasinghe to mould and shape this conference to present-day requirements.

The generous assistance received from the Ministry of Science Technology and Research and the National Science Foundation is also praise worthy.

I hope both local and international participants will actively contribute in discussions, make new connections and have a productive and memorable time during the two days of the conference at KDU. I wish you all the very best.

DR PRASANNA PREMADASA
PhD(UK) MSc(UK) BSc Hons. (Perad.)
Chairperson
10th International Research Conference - 2017

Message from the Session President



The Faculty of Built Environment & Spatial Sciences is undergoing exciting growth with the evolving global dynamics in the field. Our researchers are participating in exciting industrial oriented projects which are transforming the sphere of Built Environment & Spatial Sciences. The Faculty Session in the International Research Conference in the KDU 2017 driven by the Faculty theme "Global Space, Local Place – Protocols for a New World Order" is one such testimony which exhibits our research excellence of scholars and academics. The Faculty Session will be held for two days. The plenary session on the day one would be chaired by Archt. Prof. Chitra Weddikkara and the plenary speakers would be Prof. Qingyun Du a Professor of GIS and Cartography, Dr. A.G.H Jayalath Edirisinghe a Senior Lecturer at the Department of Civil Engineering University of Peradeniya, Mr. S.D.P.J Dampegama the Additional Surveyor General (Field). The next day would be followed by three technical sessions and one multi-disciplinary session comprising of sixteen research presentations and poster presentation. I hope this unique international and multidisciplinary conference will provide our participants with a truly transformative experience through a variety of knowledge and perspectives in the sphere of Built Environment & Spatial Sciences. I feel appreciative of the sincere collaboration and strong commitment shown by my Faculty Staff in organizing this faculty Session and would like to extend my best wishes for all the participants for a successful conference.

Dr. AH LAKMAL
PhD, MSISL, MIEEE
President
Faculty of Built Environment & Spatial Sciences

Plenary Sessions

GLOBAL SPACE, LOCAL PLACE: PROTOCOLS FOR NEW WORLD ORDER

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Not like other industries, the construction industry has without a doubt never passed through a prime revolution with the development of new technology. As a result of that the productivity within the industry remained static over the last 30-40 years. However, this situation is progressively changed and it can be predictable that a dramatic change will be there very soon and some preliminary changes are already taking place. Although, these are not yet on a sufficiently wide scale they have been addressed many aspects of the construction industry over recent decade. Therefore, it is a clear fact that in few years definitely there may be a new world order in construction due to the impact of technological as well electronic innovations and with it new protocols in the future. The key of these new movements is basically 'digitalization'. Most of the construction projects are incorporating systems of digital sensors, intelligent machines, mobile devices, and new software applications recently. One of the major transformation is integrating with a central platform of Building Information Modelling (BIM) and it is practicing successfully even in few large scale local projects. Further, the construction procurement methods such as Construction Management, partnering combined with PFI/PPP have emerged and used in most of the local infrastructure developments. As construction projects significantly contribute to the environmental issues due to its massive consumption of energy and other natural resources during the whole life cycle of the project, the sustainability and green building concepts have been gradually incorporated. One of the new aspect being considered throughout the last few years is the 'climate responsive architecture' instead of using fossil power for heating and cooling requirement of the building. Further, due to the extreme urbanisation in the last decade most of the major cities in the world has become congested and unplanned. Several solutions have been tested by the planners and the succeeded outcome is the "Smart City" concept. Smart cities are developed urban areas designed with a perspective of creating high quality of life by using digital technologies or information and communication technologies (ICT). There are more than 250 smart city projects over the world and the majority of projects are in Europe. This concept is already brought to the local context and it will become reality in the near future.

Keywords: Construction Industry, Technology, Urbanisation, Sustainability

PROTOTYPE UBIQUITOUS VISUALIZATION SYSTEM BASED ON AUGMENTED REALITY WITH MOBILE PLATFORM

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With the rapid development of mobile Internet, outdoor augmented reality system is used in the more and more scenarios, such as social networking, shopping online, entertainment, etc. Augmented reality system is at the heart of the design of the tracking and register algorithm, the mainstream algorithm is mixed tracking registered thought, the visual identification tracking registration is the key in hybrid registration algorithm, the traditional algorithm relies on extracting the feature points, but the large amount of calculation and low accuracy affects the efficiency of tracking and register. Along with the deep learning thought in the field of computer vision, the image recognition model based on convolution neural network has also been widely used, and experimental results show this new algorithm greatly improves the image recognition accuracy and efficiency. This paper studies many convolution neural network models for image classification and target detection of, analyses the advantages and disadvantages of each model, and on the basis of SSD excellent convolution neural network (single detection model) model changes the front three layers network structure, reduces the depth of the network, designs the different aspect ratio of the default frame, to simplify the model used to identify outdoor geographical target. Referred to ImageNet and PASCAL VOC 2007 training sets, this paper collects experimental data and designs the training and prediction data sets, and then trains this simplified model on deep learning platform MXNET, as a result, the simplified SSD model, the mAP reaches 58.2% and an image processing time is 0.03s. This paper uses the deep learning thoughts for solving the problem of the tracking and registered in mobile augmented reality system, develops a prototype system with based on sensor of visual perception and visual identification based on the deep learning, this system is using local mobile client mode, takes advantage of the android mobile phone posture and sensor system to obtain the current position information, and the trained simplified SSD model is used as a image recognition of engine, uses GPU to complete the calculation process, in addition, designs of a 2d and 3d information for the local geography target and provides a simple interaction pattern. Finally, in the actual test, the time of process images reach to 1.5s and target recognition confidence is at around 90%.

Keywords: Outdoor AR System; Deep Learning; CNN; SSD Model

MODELLING THE RELATIONSHIP BETWEEN SPATIAL CHARACTERISTICS OF URBAN LAND USES AND HOUSEHOLD TRAVEL PATTERNS (A CASE STUDY OF COLOMBO DS DIVISION

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The city is considered as a complex system with the interaction of numerous sub systems and transportation, which is the main crucial sub system of urban area that determines the activities (Handy, 1998). Some of burning issues in urban area at present had significant influence on direct and indirect connections with lack of integration of land use and transport (Litman, 2012). Land use and transportation system are considered as two most important systems that determine the function of the area. The relationship between the land use and transportation has been accepted within many disciplines such as urban planning transport planning, geography and economy. Different strategies such as job housing balance, transport oriented development, transit villages, smart growth, etc., have been adopted in the present urban planning as alterative ways to integrate the land use and transportation more effectively (Xueming, 2013). This research reflected on the relationship between land use characteristics and household travel pattern within an urban area by considering household socio-demographic factors. The study was carried out within the Colombo DSD area in Sri Lanka to estimate the relative importance of various land use characteristics on travel pattern. Household questionnaire survey was carried out to identify the general household travel pattern with the Colombo DSD area. Multiple regression modeling technique, ArcGIS and SPSS were utilized to conduct the required land use and travel pattern analysis. The relationship among spatial characteristics of land uses and household socio economic characteristics on the household travel pattern was evaluated by using Pearson correlation analysis and stepwise multiple regression analysis.

Key words: Land use, Travel Pattern, Correlation Analysis, Household Level

ROLE OF PROFESSIONALS IN DEALING WITH ROAD TRAFFIC ACCIDENTS

AGHJ Edirisinghe
Faculty of Engineering, University of Peradeniya

According to the information published by the World Health Organization (WHO), road traffic accidents is responsible for nearly 1.3 million deaths per year around the globe. Further, they mention nearly 50 million critical injuries are also report due to road traffic accidents.

Though proper and accurate calculations are not possible for economic analysis, many research say that nearly 1.2 % of GDP is wasted because of traffic accidents.

Though it is a common practice to blame only one or two groups as responsible for accidents, many research prove that effect of various contributory factors at different contribution ratios are responsible for a given road traffic accident.

Many parties responsible for traffic accidents can be named using ythe etter "P" such as Pedestrians, Police, Politicians, Parents, Principals, Professionals etc. Many research are carried out related to road traffic accidents concentrated on the Four "E" concept. It is Engineering, Education, Enforcement and Encouragement.

Under such circumstances, I would like to present findings of some research work carried out during last few years to highlight the effect on attitude towards safety gears by drivers, safety of school children, self reported angry behavior of drivers, safety at railway crossings, effect of road markings on driver behavior etc. to highlight the relevance of different angles and aspects of road safety.

As such the attempt of this presentation is to highlight the complex nature of road safety related issues and to encourage professionals of different disciplines to work as a team to eradicate this menace.

EMERGENCY MAPPING OF MEETHOTAMULLA GARBAGE DUMP COLLAPSE

SDPJ Dampegama
Additional Surveyor General, Survey Department

An unexpected collapse of Meethotamulla Garbage dump has occurred on 14th April 2017 at about 1500 hrs. This caused 32 deaths and complete destruction of about ninety buildings / structures and displaced about 1750 persons. This paper presents technologies and methodologies used to create emergency maps for rescue missions, methods for mitigation of further collapse and methods of monitoring and remedial actions to stabilize the dump site to prevent future collapses.
The whole process was sub divide in to four steps as follows.

- Locate the positions of the houses precisely in order to make necessary attempts to rescue trapped persons pinned under the dump slide.
- Identification of danger zones and evacuate residents and properties to prevent from possible collapses in future.
- Make necessary actions to monitor and stabilise the dump site.
- Identification of ownership of the damaged properties in order to pay compensation and other relief measures.

The first priority was to locate the houses buried under garbage slide. As about 35m height column of garbage along the south-east ridge of the garbage dump has collapsed on to the houses which were built closer to the foot of the garbage dump. It was very difficult to get reliable and consistent location of the houses buried under the dump from the evidence of the eye witnesses who are in panic status. This presentation describes the methodology and tools utilised to pinpoint the locations of the buildings buried under the garbage. The stability of the garbage dump which was not collapsed to be envisage. The technology used to monitor the possible movement of the garbage dump is also described in this presentation. The ownership of the area under the danger circle is to be investigated for payment of compensation and relief distribution. A land information system was also created in order to achieve the above task. This paper present wide spectrum of technologies such as Lidar imagery, Point clouds from drones and precise positioning using continuously operated reference systems in detail.

Technical Sessions

INLAND WATERS AND WATERFRONTS: CHALLENGES AND OPPORTUNITIES IN URBAN DEVELOPMENT WITH REFERENCE TO SELECTED EXAMPLES IN COLOMBO AND SUBURBS

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From early days water has been one of the main concerns in urban planning. Most of the early civilizations such as Minoan, Mesopotamian and Egyptian civilization have developed in association with water bodies. The same phenomenon is apparent in Sri Lankan context and development of early Anuradhapura civilization in association with Malwathu oya is a valid example. The primary reason for such early civilizations to develop as such is observed as to fulfill basic needs of the inhabitants' day to day life, such as for drinking, agriculture, and sanitary purposes. But with the increasing demands of rising population, urbanization and land scarcity, utilization of water bodies became multi-faceted. This is well evident and observed in relation to Sri Lankan context, as at certain instances urban waters and water fronts are found to be well utilized as assets in urban development, while in some other instances they have become just dumping yards and health hazards in urban areas.

The study expects to analyze selected urban waters and waterfronts in Sri Lankan contexts ,to explore and evaluate their positive and negative contribution in urban development. Certain theories and principles will be applied in such analysis and the findings will be utilized as a tool to evaluate the strengths and opportunities of underutilized urban water bodies .With such evaluation and analysis it is expected to suggest the ways and means of utilizing abandoned urban water bodies in the Colombo city in a progressive and constructive manner, to overcome problem associated with urbanization.

Keywords: Waters and Waterfronts, Urban Development

MEASURING PHOTOVOLTAIC POTENTIAL IN THE URBAN ENVIRONMENT

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The knowledge on available solar potential in the urban and rural environment is a stepping stone and foundation to achieving sustainable development. With the ever-increasing levels of CO_2 emissions and global warming, the requirement for alternative sources of energy is at an all time high. A method of offsetting the usage of non-renewable energy is by increasing the utilisation of renewable energy, namely solar power. A major obstacle faced in developing photovoltaic implementation is the uncertainty of solar potential in the specified region, followed by the uncertainty of how to obtain urban data in the area. This paper attempts to review the different methods available to estimate solar irradiation availability, and the methods of acquiring urban data in cityscapes. These include accounting for shadow patterns, and range from simple 2D visualisation to more complex 3D representation. Finally, the paper looks into conducting a case study to estimate the overall photovoltaic energy potential of an average house in Sri Lanka, via the use of Rhino 5. This study is done via the analysis of previous literature and attempts to devise an ideal method to classify tools to measure photovoltaic potential in the urban environment.

Keywords: solar, potential, mapping, modelling

AN ASSESSMENT OF COLLECTIVE IMAGE OF URBAN SCAPE IN THE CONTEXT OF RAPID DEVELOPMENT WITH REFERENCE TO MAHARAGAMA

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The city of Maharagama, located in the district of Colombo, Sri Lanka is known well as a trade node for garment industry. The Institutions such as the Youth Center, Institute of National Educational Department and the Cancer hospital that treats all of the cancer patients in the country, along with the development of the southern Highway, Maharagama came up into focus, also acquiring certain functions from Pettah (the central bazar district of sri lanka). The fast evolution of the city towards the above- mentioned points, makes Maharagama an important city to be of concern.

As a result the built environment of Maharagama started to change rapidly and the floating population became majority. Hence the legibility of the urban scape becomes important. Every city person who experiences the urban space, perceives a private image which will define the place personally. A unity in many such images of population of the place is the collective image of the city. This can be considered one of the best aspects to evaluate quality of uranspace.

Using the "Image of the City" by Kevin Lynch as a guide, study area was analyzed to for its image by using the same, tools which Lynnch used to study American cities; Boston: Massachusetts, Jersey City: New Jersey, Los Angeles: California. For the study, several areas of approach were discussed such as

- the paths and other elements,
- city form,
- the sense of whole,
- metropolitan form
- process of design.

Data gathered on mental image in search of collective image of city was categorized in groups to study the patterns and identities of place with reference to the perceiver's background. Outcome in the pictorial form is presented as a proposal to be defined as the image of maharaga city.

Key Words: City Image, Imagibility, mind map, spatial cognition, urban space

PROFILE OF RISK FACTORS, CHRONIC NON-COMMUNICABLE DISEASE STATUS AND PURPOSE OF USING WALKING TRACKS AMONG USERS IN KOTTE AREA, SRI LANKA.

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Introduction: Tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol increase the risk of most Non-communicable diseases (NCD). NCDs kill more than 36 million people each year. Nearly 80% of NCD deaths - 29 million - occur in low- and middle-income countries. More than nine million of all deaths attributed to NCDs occur before the age of 60; 90% of these "premature" deaths occurred in low- and middle-income countries.

Aim: As walking tracks (WT) were newly established and Sri Lankans were new to this concept, it was hardly any studies to assess reaching of goals of the policy.

Method: In 2014, a total of 428 individuals, attending to selected WPs in Kotte area were randomly assigned to collect data by using interviewer administered questionnaire. The participants were surveyed of their risk factor and disease status of NCD, and purpose of using WT.

Results: 46% (n= 197) were diagnosed of having any type of chronic non-communicable disease and among diseased participants, 51.3% (n=101) were having cardio-vascular disease if they were suffering only one disease. While 24.4% (n=48) were suffering from diabetes mellitus, 19.8% (n=39) got more than one NCD. 23.4% (n=100) were ever smokers, while 32.5% (n=139) were experienced stress due to their

Keywords: Physical activity, Walking Track, Non- communicable disease, risk factors, NCD Policy

INVESTIGATING THE USE OF GIS IN SELECTED SUPPLIERS FOR CONSTRUCTION INDUSTRY IN A COST-EFFECTIVE MANNER

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In the field of construction, the ability of finding materials are required for construction projects in a cost-effective manner and it is indispensable for better results of a given project. This is mainly important for mass construction sites and projects which are undertaken island wide. The process of finding suppliers for these projects are currently prepared manually without any specific way in the construction industry, which leads to a major wastage of time, physical and financial resources of the project and etc.

GIS or geographic Information system is a branch of modern technology which is designed for inputting, storing, manipulating, analysing and reporting spatial data and information with an organized collection of computer hardware, software, procedures and personal designed to handle all phases of geographic data capture, storage, analysis, quarry, display and output.

This research thus intends to study the use of GIS to find the suppliers of materials in a cost-effective manner minimizing the wastage of resources. Data collection for this study will be accumulated through several ongoing construction projects and several mass construction companies and will be manipulated and analysed through the knowledge of GIS and will be compared with the traditional method of selecting suppliers for the construction projects.The ultimate objective of this study is to ascertain whether GIS can be used as a tool to achieve success of the construction projects within the given time with less wastage of available resource.

Keywords: Manipulating, Cost-effective, Quarry

APPLICATION OF BUILDING INFORMATION MODELING IN CONSTRUCTION PROJECTS OF SRI LANKA, TO OPTIMIZE COST, QUALITY AND TIME

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The Construction projects have made various attempts to reduce wastages (cost, time, quality), in order to avoid the disputes that has the possibility to force the economy and difficult to indicate growth of the Gross Domestic Product (GDP) index. Now a days, most of the on-going projects are delayed due to those events. The application of Building Information Modeling (BIM) has been increasingly adopted to overcome situation as potential solution. BIM is not a single piece of software, but a new form of information processing and collaboration, with data embedded within the model. Each discipline or organization creates its own model, and these are subsequently amalgamated to provide a combined view of the project. Consequently, this is an area where all stakeholders can involve with the project in different stages in the construction. The world has practiced the BIM in many years in the construction. This study explores to review BIM application in Sri Lankan construction industry based on case studies of three construction projects, which are using BIM practices. Data will be collected by interviewing three participants from each of selected on-going construction projects. Based on the case study findings and preliminary review, a framework will be developed for BIM application in construction projects which can lead to an effective and efficient management system in construction practice and comparison with the world practice.

Keywords – BIM, Reducing wastages, delays financial expenses, construction projects, Stakeholders

PRELIMINARY ANALYSIS OF IMPACT OF FOREIGN LABOR PARTICIPATION ON THE CONSTRUCTION INDUSTRY IN SRI LANKA

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The construction industry in Sri Lanka comprises of infrastructure development of national requirement and buildings which serve for many industries i.e. tourism, transport, aviation, education, health and the related building projects for private and public clients. The labour component is one of the resources and a significant cost factor which affect the development of projects. As there is a scarcity from local contribution, the contractors tend to employ the foreign labor to carry out the current construction projects.

Due to the above predicament, there will be an increase of unemployment rate, decline in Gross Domestic Product (GDP) index on employment factor and a critical impact on the money flow out from country due to the foreign employment wages.

On the other hand, annually, the school candidates sit for the GCE (O/L) examination is about 290,929 students and out of whom about 210,340 students apply for GCE (A/L) examination as per year 2015 statistics. Hence, school leavers before A/L is approx. 80,000 which might go to the production team in various industries.

This research aims to quantify the involvement of foreign labour man power involvement currently and compare against after O/L leavers to mitigate or replace the foreign labour component which would provide solution for National economic.

The research would be conducted through a SWOT analysis and information will be collected through the statistical reports under the secondary data collection and survey would be conducted to identify the primary data collection.
The outcome of research would facilitate professional development authorities to take necessary national policy planning measures in order to increase the school leavers' contribution to the construction industry under skilled category.

Keywords: Construction Industry, employment, foreign and local labour, SWOT analysis

IMPACT OF THE COST FACTOR ON IMPLEMENTATION OF GREEN BUILDING CONCEPT IN SRI LANKAN CONSTRUCTION INDUSTRY

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Today the world is facing major issues in terms of environmental pollution, depleting of natural resources & energy crisis due to the vast development in the construction industry which is taking place in all over the world. Green Building is a concept that intends to address these issues being eco-friendly, energy efficient while sustaining natural resources for the future generation. In keeping with the global trend of using this green building concept as a solution to overcome these problems, Sri Lankan construction industry also has adopted this concept to some extent with certain drawbacks in its implementation. This study thus seeks to examine the research question as to how far the construction cost factor incurred when adopting the green building concept affects its smooth implementation. The research is being carried on the hypothesis that the initial cost which has to be invested when adopting this concept is the major issue that discourages the "Green Building Concept" in Sri Lanka. Data for this study would be collected from questioners, site visits, on site observations of the completed & ongoing projects which have adopted the Green Building concept. In addition, structured and semi structured interviews will be conducted with the relevant professionals and the other stakeholders. The ultimate objective of the study is to evaluate the link between the cost factor and the Green Building concept while attempting to investigate the other drawbacks in its implementation and to suggest a suitable frame work to adopt Green Building concept, cost effectively to the Sri Lankan construction industry.

Keywords: Green building, Project cost, Energy efficiency, sustainable development

ESTIMATION OF SEA LEVEL RISE IN COLOMBO WITH SATELLITE ALTIMETRY DATA

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Recent researches have confirmed that the sea level has risen globally during the 20th century and it is still going on. Being an island nation located at the centre of the Indian Ocean, Sri Lanka is also facing the consequences of this rising sea level. There are several possible negative impacts of sea level rise such as inundation of land, increased beach erosion, increased flood and storm damages, increased salinity of coastal water bodies and coastal ecosystem losses. Therefore, an understanding and estimation of past and future changes in sea level is very much essential in coastal management in Sri Lanka. Historically, the coastal tide gauges being the main technique to measure sea level changes. However the distribution of these gauges is sparse and located mostly along the coastline. Therefore, it is inadequate to get a complete picture of this global phenomenon. Since late 1980s, the satellite altimetry missions have provided comprehensive data sets with higher degree of global resolution. Generally, altimeter is measuring the distance from satellite to the water surface using a short radar pulse. In this study, the sea level rise around Colombo has estimated with the satellite altimetry data from 1993 to 2012 and the estimated sea level rise during the period was 2.51 mm per year. Further, the tide gauge data obtained at Colombo Port is used to validate the results and the correlation coefficient was 0.79 between the altimetry and observed tidal data. This confirms that altimetry measurements can be successfully used to analyse the long term sea level changes.

Keywords: Sea Level Rise, Satellite Altimetry, Coastal Zone Management

ACQUIRE HIGH RESOLUTION AERIAL IMAGES FOR RAILWAY MAPPING BY USING QUADCOPTER

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The use of drone imagery has become increasingly popular in recent years as it is a cost-effective method for generate high spatial resolution images in a limited geographical area. By way of the availability of very high-resolution orthophoto maps provide good opportunity for reconstruction of railway track. Colombo Suburban Railway Project was started to modernization of the railway network in the Western Province of Sri Lanka. Centre for Research and Development (CRD) has agreed to provide high resolution maps for the project. CRD developed quadcopter especially for aerial surveying purposes. All the images have been acquired by 20 Mega pixel camera mounted on a 3-axis high performance gimbal. Tailor made software was used for mission planning and few main off the shelf geo-processing software were used for image processing. High overlapped vertical aerial images of Unmanned Aerial Vehicle(UAV) photogrammetry are capable to make higher dense and more reliable spatial products. Several commercial and non-commercial software packages have been developed to process UAV image data. This study conducted in railway track between Panadura to Veyangoda included 64 kilometers. Accordingly, it was required extensive field work to produce ultimate ortho maps. One main advantage of the findings is acquisition of extremely high spatial-resolution imagery with minimum cost.

Keywords: Drone, photogrammetry ,spatial resolution, ortho maps

PREPARATION OF LANDSLIDE HAZARD ZONATION MAP IN UPCOUNTRY RAILWAY LINE USING GIS & REMOTE SENSING

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The area extending from the Edalgashinna to Bandarawela has become more vulnerable to landslide disaster than the other areas in the Sri Lanka's upcountry railway line.Therefore, landslide hazard along the upcountry railway line has turned into a national level issue. Due to the high-intensityof rainfall, soil erosion, soil structure,slopes, geological structure, deforestation and another human activates are aninfluence to increasing the landslides along the upcountry railway line. Therefore identification of landslide hazards areas along the upcountry railway line is important. The objective of the study is to the preparation of a landslide zonation map and identifies the landslide high-risk areas from Idalgashinna to Bandarawela along the railway line. This study based on secondary data. Mainly used Digital Elevation Model (DEM), rainfall, river network, soil and land use data. All the data were analyzed with Analytic Hierarchy Process (AHP) to calculate three weighted class such as High, Moderate, and law. After that, all vector data were converted into raster formats. Final risk map cratered using weighted overlay techniques. According to findings, the risk map can be classified as high risk (40%), moderate risk (34%) and low risk (26%).Most of the landslides occurred in the high risk and moderate risk areas represent the reactivation of historical landslides. Therefore it is proved that validation of the hazard zonation map with real incidences. In the study area, most of the high and very high hazard class areas were found occupying the areas of the railroad.

Keywords: landslide, geographical information system, upcountry railway line, hazard zonation map, remote sensing,

AUTOMATIC DATA EXTRACTION OF SURVEY DEPARTMENTAL HARDCOPY DOCUMENTS

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This research was conducted to develop a methodology for automatic extraction of Survey Departmental hardcopy document archives and make digital copies of them. Currently survey department has one of oldest and systematic hardcopy document archive in Sri Lanka, which was started during British rule. To maintain, store and transfer that hardcopy documents lots of resources and manpower are using. If a methodology can be developed to
Conversion of this hard copy documents in to digital copies, lots of advantages could be achieved. Some of the advantages are to maintain and store softcopies comparatively low cost is required, it is much easier to transfer data via email and data could be make available in online databases, comparatively low storage space is required.

In extracting information from hard copies mainly two kinds of data will be extracted, one is line feature extraction from hardcopy plans, and the other is extraction of character data from plans and Tenement Lists. To extraction of lines and characters from scan copies there are lots of free open source software available, also survey department now use some commercial software which has capability to perform automatic extraction of line features. In this research, from the available resources and software, methodology will developed to conversion of hardcopy to softcopies with low cost, less human interaction and less time consumption.

When performing automatic digitizing instead of using raw scanned image as output, raw image could be processed and do some enhancements, such as replacing missing pixels in a line feature which is on raw image, use different bands to acquire different line types(for cyan colour Grid lines one band, for black colour boundary lines one band) etc. Then automatic digitizing would produce quality result. Even though there are many free open source and commercial software which have capability to perform automatic digitizing they are useless if they reduce the accuracy of the plan. Therefore all the available software were used and results will be overlay with original hard copies and find best software that produce result without losing accuracy of the original plan.

Currently Survey department has Plans and Tenement List Prepared from All three Languages Sinhala Tamil and English. But since most software are prepped for English character recognition initially study will conduct to extract characters from hardcopy documents prepared with English language, later methodology will be developed to convert Sinhala and Tamil letters. Since when producing survey departmental documents, lettering was done in a standard pattern which mentioned in Technical Instructions published by survey department, recognizing those characters could be much easier than other normal hand written documents. Another problem faced when extracting information from Tenement List was to after extracting those information placing them in cells of table.

Final results will be digital Cad drawing files of Plans, Shape files of Plans, Word documents and excel sheets of Tenement Lists.

Keywords: Automatic Digitizing, Automatic Line Extracting, Automatic Character Recognitions,

A GIS BASED SYSTEM FOR DISASTER RISK ANALYSIS, PREVENTION AND MITIGATION

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Natural and manmade disasters are common occurrences in the modern world. Life and property losses and economic damages occur due to these disasters. By starting relief operations immediately and in a coordinated way, it is possible to minimise the damages occurred by these disasters. An application was developed by combining remote sensing, GIS and mobile communication technologies to report the disaster occurrence, location and magnitudes, to collect data on the site and to identify appropriate remedial measures to be taken by the respective authorities. This is a web based Geographic Information System (WebGIS) tool that can be used in both ground and command level.

The system has several components to face the common challenges occur during disaster relief operations. The system has been tested for its accuracy. Though it was developed initially as a military application, it can be used for commercial, academic and other practical situations.

Keywords: Disasters, Mobile communication, Web GIS, Remote sensing.

AUTOMATED VEHICLE NUMBER PLATE RECOGNITION SYSTEM FOR SRI LANKA USING DIGITAL IMAGE PROCESSING TECHNIQUES IN MATLAB SOFTWARE

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Due to the involvement of Computer and information technology in the modern world, a demand for information systems to process data about vehicles exists. If that information system is an automated system, time and money can be saved and the result of an analysis will be reliable because a computer is being involved. Today many developed countries used Automated Vehicle Number Plate Recognition systems for both security and commercial purposes. These systems used for speed enforcement, entrance and exits in highways, toll collection, parking lots. These systems also can be used in where highly secured areas exist. Automated systems have been developed to detect many tasks in Sri Lanka. But Automated Vehicle Number Plate Recognition System has not been developed for Sri Lanka yet. It also has been observed that number plates of vehicles in Sri Lanka has different sizes, shapes also have different colors. A technology called Optical Character Recognition is used to read image and recognize the number plate accordingly. The research focuses on Processing an image of a Vehicle by using neural network technology through the MATLAB software for number plates in Sri Lanka. Also, doing an accuracy assessment of the algorithm which we are building. This research will propose that this system can be implemented for the entrances and exits of highly restricted areas, express ways, areas under government control, Parliament, Courts etc. The problem includes image processing techniques, computer algorithms which will handle the recognition of vehicle plates, character segmentation, normalization and recognition, and manage the details with a database. This research will also focus on how accurately the proposed techniques, computer algorithms perform under conditions, specially under different light conditions during capture, and image skew, translations.

Keywords: Optical Character Recognition, Neural networks, Accuracy assessment

IMPACT OF ATTITUDES OF STUDENTS ON PROFESSIONALISM: A CASE STUDY OF THE STUDENTS OF FACULTY OF BUILT ENVIRONMENT AND SPATIAL SCIENCES (FBESS) AT KOTELAWALA DEFENCE UNIVERSITY (KDU)

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Various issues related to professionalism have been discussed in different contexts as they directly affect the human society. Involvement of professionals can be seen wherever intellectual achievements become operations. Professionalism has also been questioned in terms of lack of professionalism, professional negligence, etc. in many cases where adverse effects result during or/and after above-mentioned operations of social mechanisms. 'Attitudes' of professionals have been highlighted in different discussions closely with the issues related to professionalism. Although numerous professional degree programs are being conducted in Sri Lankan Universities, proper studies on students' attitudes and students' professionalism cannot be observed.

This study examines the impact of attitudes of students on professionalism, involving the students of Architecture, Quantity Surveying and Surveying Science at KDU Southern Campus as a case. The first objective of the study is to find out the relationship between the attitudes of above mentioned students and professionalism in their respective fields. Identifying the areas of enhancing the attitudes of those students for a better professionalism is the second objective of the study. Both qualitative and quantitative methods were used in this study. Data collection method was relying on the primary data collection using a questionnaire and conducting interviews. Hypothesis was tested using questionnaires while a descriptive analysis was carried out the data gathered through interviews. The data were taken from the students of selected disciplines regarding four categories of attitudes as attitudes on self, attitudes on people, attitudes on academic activities and attitudes on environment. Stratified random sampling method was adopted to select a proper sample. Findings of the study showed a significant impact of attitudes of the students of FBESS on professionalism in their respective fields. Several areas of enhancing the attitudes were also identified in all considered categories.

Keywords: Professionalism, Attitudes, Students, KDU Southern Campus

A STUDY ON GEOMORPHOLOGICAL & LAND USE CHANGES IN THE LOWER PART OF KELANI RIVER BASIN.

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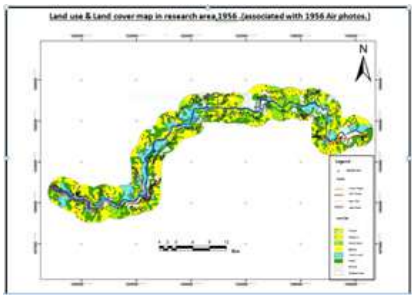
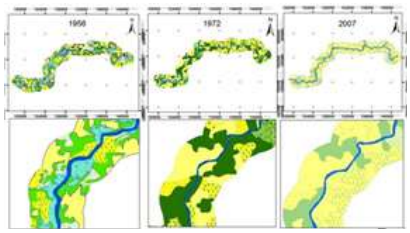
Introduction - When comparing past six decades, due to urbanization, rapid growth of industries, unemployment problem, increasing cost of living, Rapid distribution of settlement and increasing the utilization of lands are basically, influence people to engage with various livelihood based on this river valley. So it indirectly, causes to this sudden changes of Kelani river valley. Furthermore, One of the main activities that take place near the Kelani river is sand extraction where by 600-800,000m3 of sand is being extracted on annual basis. More than 120,000 of people whose main livelihood is sand extraction.(geological survey &mines Bureau,2013) Apart from that Jem and Gold mining, Bricks and clay industry can be seen in the research area. So, this activities have many adverse affects and the results are already in the open. More over, there are 1500 families live in along this river bank.on average each family has 6-8 children.Most of them receive Samurdhi benefits which is hardly sufficient to feed the whole family for month.Many can not to keep their children in school or send to health care when needed.The landless families with in this group living beside left and right river banks of Kelani river. Percentage of malnourished children is high and they rely work as hired labour in construction sites(census report,2011).Through that they are unable to satisfy their basic needs during most parts of the year.

Methodology - The main objective is to examine the geomorphological changes and land use pattern changes since 1956 -2013. Along that, The main methodology which used was, Air-photo Interpretation. With the help of Arc GIS 10,I have combined all the air-photos which were taken as separately, as suits to their flying lines. within 1km2 buffering area, I have analyzed the land use pattern changes and geomorphological changes across the kelani river bank from Avissawellla to Ambulagama. T he total length of the research area is about 30 km. Air-photos from 1956 ,1972 and 2007 which have been taken through Survey department, have been connected them together with the help of Geographical Information System. In order to that, The main Objective was Google earth is provided other necessary satellites and terrain maps to fulfill my main objective. Map 1.1
shows the land use Patterns in 1956 of the research area. At the same time, Map 1.2 shows the spatial changes of distribution and utilization of land from 1956,1972 and 2007.Through that ,it is too easy to analyze the spatial changes from year 156 to 2007.

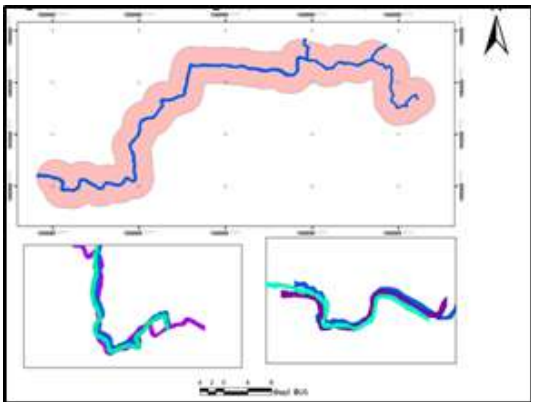


Map-1.1
Land use changes of research area in 1956-2007



To Fulfill secondary objective, Mainly the questionnaire and field visits were helpful.The questionnaire and field visits will be administered to gather quantitative data. As a sample,240 questionnaires will be distributed among the house holders who live in left and right river banks of this research area. All the sand mining locations have been taken as GPS points to create GIS maps. The Seetawaka and Dompe-weke Divisional secretariat divisions are provided other necessary data about house holders. So the research helps to reveal the burning problems which have been arisen through increasing the frequency of natural disasters in the lower part of Kelani river basin.
Map 1.3 shows the significant changes of river valley in two areas which is belonged to the research area.

Changes of River valley in 1956, 1972 and 2007.



Research Outcomes – It is clear that the sand extraction,Jem and Gold mining have been caused to increase the river bank erosion within the short term of period. (Image 1.1) So,that has been affected to occure sudden geomorphological changes along the river valley from 1956-2013. There are significant changes of lower part of the river valley. Basically, the width of lower part of kelani river is about 200 ft.But when the rive flows across Salawa, Akaraviata and Pugoda areas,this has been expanded to 350 ft.(about 107 m).

River bank erosion in Pugoda area

Image 1.1

Comparatively, the irregular settlement, has been caused to increase the frequency of flood. Apalapitiya, Gurugalla,Thalduwa and Medagoda areas prove above mentioned fact. When considering land use patterns there is tend to be increasing gardens in 1972-2013. There are few spots can be recognized as paddy fields in 2007 Air-photos. When it comes to 2013 Google earth image mostly rubber cultivation has gone up than Paddy cultivation.

STUDY ON EFFECT OF NOISE FOR THE TOTAL STATION MEASUREMENTS IN CONSTRUCTION SITE.

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Accuracy of observation is very important for surveying projects. Total Station is one of the instruments which is used to get precise measurements for the project success. It helps to get measurements according to the expected standard. EDM instruments are classified according to the type of the carrier wave employed. Instruments using the light or IR waves are classified as Electro Optical Instruments. Total Station is one of the Electro Optical Instruments which uses EDM principle. It is capable of measuring distances and angles at the same time.

When proceeding a survey in a construction site there can be huge noises due to the machines and vehicles. If these noises are effected to the total station observation it may drive to our precise measurements. The objective of this research is to study whether there is an effect to the total station measurement from these huge noises.

This study will be carried out by measuring distances and angle between two points and as the sound source we are going to use an amplifier. We expect to do this study by keeping intensity as a constant and the distance between the instrument and the sound source will be increased by 2m interval as first data collection and the second data collection will be carried out by keeping distance between the instrument and the sound source as a constant and intensity will be increased.

Keywords: Total Station, intensity, IR Waves, amplifier.

INVESTIGATING THE EFFECT OF SUN POSITION ON THE ACCURACY OF DIGITAL LEVEL OBSERVATIONS

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The knowledge of the accuracy and reliability of survey equipment is important for achieving the best results of a given project. Precise digital levels are widely used for taking vertical measurements due to their high accuracy, rapid data collection, data manipulation techniques and simplicity of using them. The digital levels represented a breakthrough in levelling techniques using the innovative concept of reading a bar coded staff. Therefore Optical readings are no longer needed.

Operation of digital levels is based on the digital processing of video indications of a coded staff. During this operation, the coded view of the staff is compared with information that is saved in the memory of the instrument.

There are several sources of errors which may affect the accuracy of the digital level observations. Among those sources of errors, the instrumental imperfections such as the reading system precision, collimation error and natural cases like temperature and humidity change, refraction have been investigated and minimized by the manufacturer. Effect of the sun position on the accuracy of the staff readings in digital levelling is another natural error which is needed to be investigated for increasing the accuracy of digital level measurements. This research thus intends to investigate the effect that the position of sun, would have on staff readings and horizontal distances measured by the digital level in a practical field scenario. Data for this study will be accumulated through observations which will be carried out during day time using a digital level with its barcode staff while keeping all the other factors that affect the accuracy in levelling as minimal. Thus, the ultimate objective of this study is to ascertain whether there is an effect of sun position on digital levelling observations and if such effect is present to find out the best way of minimizing it.

Keywords: Digital Level, Bar code, Collimation, Digital Processing

FACTORS AFFECTING APPLICATION OF HIGH-RISE BUILDING TECHNOLOGY FOR LOW-RISE BUILDING CONSTRUCTION IN COLOMBO DISTRICT

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Construction sector is a significant contributor to the economy of any country. Value of money became an important expectation of the client. In this research, main objective was to identify the technologies used in high rise building construction and to see whether it could be adopted in to low cost domestic building construction in Sri Lanka. There were ever growing number of building construction methods used in erection of high rise buildings. Construction of low cost domestic buildings experience their own pros and cons. Basically acute shortage of skilled and unskilled workforce and the foreign consultants became a severe threat for local construction industry. They were faster and better than the local counterparts. Different kinds of new construction technologies adopted in construction of high rise buildings follow high levelled health and safety standards. To harvest best finding from this research, researchers aim at discussion on the main construction technologies used with high rise building constructions. There are advantages and disadvantages with these methods and techniques. Quality in high rise buildings can be achieved with careful planning of the construction process with process efficiency, safety, simplicity and cost effective tactics, repetitive usage of variant components, quality checks, maintenance of specifications, standards and building regulations, rapid and accurate construction methods. Handling of equipment and machinery for construction of low cost domestic buildings are studied in this research. Based on the provided argument, the data was collected from senior engineers, project managers and consultants of an iconic project in Sri Lanka, "One Gall face" in Colombo, and from the contractors of small domestic building construction. Questionnaires were distributed and the effective evidences were collected from them. Based on the provided evidences and questionnaire results a quantitative analysis was done along with a qualitative study which finally resulted a mixed approach. Adoption of the appropriate technologies in high rise building construction was resulted as a successful alternative to be used in low cost domestic buildings in Sri Lanka. This paper will explore the opportunity to the low rise buildings as how to apply the building construction technology techniques of high rise buildings in the categories of building analysis technique, exterior wall ratio, parking efficiency, structural cost, heat ventilation and air conditioning cost, site work cost, and finishes.

Keywords: Specifications, Construction techniques, Construction process, Process efficiency, Repetitive usage, Building regulations