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Sri Lanka Science and Engineering Fair 2012 held at IESL

The Sri Lanka Science and Engineering Fair (SLSEF) 2012 for selecting the cream of creative and innovative among Sri Lankan school children for participation in the Intel International Science and Engineering Fair (Intel ISEF)2012 to be held in Pittsburg, USA was conducted at the Wimalasurendra Auditorium of the IESL on 2nd February 2012. The Intel ISEF is where the best of world’s best young scientists and inventors from over 50 countries come together each year to share their ideas, showcase their cutting edge science and engineering projects and win awards and scholarships.

The SLSEF is a joint effort where the Ministry of Education, National Science Foundation (NSF), Intel® EM Limited-Sri Lanka Liaison Office and the IESL had joined hands since 2008 to promote creativity and innovation among the country’s younger generation. Every year 20 competitors are selected from two separate competitions, the Science Research Project Competition (SRPC) conducted by the NSF and the Junior Inventor of the Year (JIY) competition conducted by the IESL, to compete at the SLSEF to select 2 to 3 of the best among them to participate at an international level in the Intel ISEF held in USA.

Since beginning to participate in the Intel ISEF, student protégées of Sri Lanka has done the country proud by managing to win awards and recognition winning the 3rd grand award and on their 2nd appearance and clinching the 1st place grand award in Computer Engineering at the Wimalasurendra Auditorium of the IESL on 2nd February 2012. The Intel ISEF is where the best of world’s best young scientists and inventors from over 50 countries come together each year to share their ideas, showcase their cutting edge science and engineering projects and win awards and scholarships.

The above Training Programme which was scheduled to commence on Saturday 31st March 2012 has been postponed due to unavoidable reasons. The new commencement date will be 21st April 2012.

Contd. on page 8...

Moratuwa Robots Win the International Inexus Competition

Recently, University of Moratuwa (UoM) students brought glory to our country by winning the premier international robot competition, Techfest 2011.2012 Nexus. Two University of Moratuwa student teams competed early this month and won 1st and 3rd place, beating teams from Australia, Thailand, and India. This year, the competition was held in the Indian Institute of Technology (IIT), Bombay, India. The winning team comprised of Anuruddha Tennakoon, E. G. Niroshan Karunarathne, Hirantha Subasinghe, Chanaka Ranathunga, and Nipuna Chathuranga Rangarathna. The third place was won by the team comprising of Dakshina Mudunkotuwa, Lajjunuge Loganewsaran, Jerad Asanka Perera, Nisan Panagoda, Pradeep Pathirana, Yasitha Mallawarachchi. These teams were mentored by Dr. Rohan Munasinghe, a Senior Lecturer attached to the Department of Electronic and Telecommunication Engineering.

Moratuwa students have consistently been at the forefront winning international competitions. In 2009, a University of Moratuwa Team, "Mora Seekers", emerged victorious among 721 from more than 40 countries in the coveted IEEEXtreme global competition. IEEEXtreme is the world’s most extreme programming competition. The Institute of Electrical and Electronic Engineers (IEEE) is the world’s largest professional organization for advancement of science and technology with 365,000 IEEE members in over 160 countries around the world. In 2011, a Moratuwa teams won the 2nd and the 9th place among 1500 teams. For the last five years, Moratuwa has had the highest number of submissions, and awards, and completed projects in the Google Summer of Code program.

Contd. on page 9....

ENGINEER’, the Journal of the Institution of Engineers seeks International accreditation

“ENGINEER”, the Journal of the Institution of Engineers, Sri Lanka, has been launched in 1973 as a quarterly technical publication. Since then 126 issues have been published in XXXXV (45) volumes, though in several years between 1980 and 2004, four issues per year had not been possible. ISSN classification was obtained for the Journal in 2005. During the 38 year long history this journal has attained the status of being the apex periodical on Engineering in Sri Lanka.

During the 2010/2011 session of the Institution, the Editorial Board for publications took a special interest in the evaluation and accreditation of the journal ENGINEER under international standards. In view of this, an application was made in January 2011 to Thomson Reuters, who maintains the Web of Science database which cites the included journals on Natural and Applied sciences under the Science Citation Index Expanded™. The evaluators are especially vigilant about editorial content, quality and timeliness of publications.

In line with the application guidelines, five issues of the Journal had already been submitted to the evaluators. Thomson Reuters have intimated that the evaluation process is continuing and a decision is forthcoming in the near future.

In tandem with the accreditation process, a system has been put in place to make current as well as past Journal issues available on the Institution web site in an easily accessible and printable form. This will further enhance accessibility and citation of the works published in the journal.

Eng. Prof. T. M. Pallewatta
Editor, ENGINEER (2005 ~)
Notice for all member categories:

Membership Subscription Payments and Receipt of Publications

Council of the IESL has decided to strictly implement the following conditions regarding the receipt of membership subscriptions and the issuing of publications.

1. If the subscription for the particular year is in arrears by 31st March of the same year, issuing of publications to that member will be stopped from that day onwards.

2. If the subscription for the particular year is in arrears by 31st October of the same year, then the name of that member will be removed from the IESL membership roll according to the By-laws of the Institution.

For the attention of the applicants for memberships

(A) Submission of membership applications:
Applications for all membership Categories (Including Transfers):
Duly completed membership applications for all member categories (including the transfers) are accepted at the Membership Division of the IESL on Mondays, Tuesdays and Fridays (but not on holidays which may fall on these days).
All applicants are kindly requested to refrain from coming to IESL for such submissions on Wednesdays, Thursdays and during week-ends.

(B) Applications/Transfers to “Member” category:
All Engineers who wish to apply for the Corporate Membership (To obtain Charter of Engineer Status) are advised to read the “Professional Review Rules” of the IESL (Available in the Website)

All applicants are supposed to do a self assessment with reference to the “Professional Review Rules” before submitting an application.

Those who really need further clarification may write (Emailing is ok) to The Executive Secretary – IESL or Meet the Director (Membership), but restricting to above 3 days (Monday, Tuesday and Friday) of the week.

Candidates may call and check the possibility of attending to their matter before they personally come to the IESL.

Notice of membership renewals and receipt of publications

Repeated/Extended membership applications, late applications or late renewals are not accepted from October 1st onwards for the subsequent year.

Council of the IESL has decided to strictly implement the following conditions regarding the receipt of membership subscriptions and the issuing of publications:

1. If the subscription for the particular year is in arrears by 31st March of the same year, issuing of publications to that member will be stopped from that day onwards.

2. If the subscription for the particular year is in arrears by 31st October of the same year, then the name of that member will be removed from the IESL membership roll according to the By-laws of the Institution.

Notice of fee payments for the renewal of membership:

All members are kindly requested to make the payment of membership fees in advance, along with the application for renewal, during this month. It is not possible to accept such late applications.

Notice for all member categories:

Membership Subscription Payments and Receipt of Publications

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THE INSTITUTION OF ENGINEERS, SRI LANKA

Competition on

“Eco Efficient Water Infrastructure for Sustainable Development – Experiences gained from Integrated Water Resources Infrastructure Development in Sri Lanka”

Session 2011/2012

Sponsored by

St. Anthony’s Industries Group (Private) Ltd.

(MANUFACTURES OF ANTON PVC PIPES AND FITTINGS)

Two competitions will be held this year for the award of certificates and cash prizes. The competition soliciting original Technical Papers on research and case studies are accepted from members of IESL who are above 35 years.

There will also be another competition for members who are 35 years and below on 01 October 2012. This competition is open to members of IESL and final year students of Faculties of Engineering of Universities in Sri Lanka who are student members of IESL or who obtain such membership before submitting their technical papers.

AWARDS & PRIZES

ABOVE 35 YEARS ON 35 YEARS AND
BELOW ON 2012.10.01

First Prize- Rs. 50,000/= First Prize- Rs. 25,000/= Second Prize - Rs. 25,000/= Second Prize- Rs. 15,000/= Third Prize- Rs. 10,000/= Third Prize- Rs. 5,000/= The members (Fellows, Members, Associate Members, Associates, Companions and Students) who wish to participate must obtain the application forms from IESL and submit bio data & full Technical Papers to reach the Executive Secretary, Institution of Engineers Sri Lanka, No. 120/15, Wijerama Mawatha, Colombo 07 on or before 30 May 2012.

Further information could be obtained from the Chairman, Steering Committee on Water Resources Development of The Institution of Engineers, Sri Lanka, on Tel: 072-3421493 or Publicity Officer-IESL 011-2685490, 011-2699242 or 011-2699210, ext- 232 , 207,
E-mail: dir.pub@iesl.lk, ieslpub@gmail.com, Fax: 011-2699202

NOTICE

APPLICATION FOR INCLUSION IN THE DIRECTORY OF QUALIFIED PERSONS, BUILDING SERVICES ENGINEERING

According to Urban Development Authority Law No.41 of 1978, when Building Plans are submitted for approval the UDA may request that such drawings are prepared by a Qualified Person in the field of Building Services Engineering.

In order to fulfill this requirement the IESL is calling applications from its Corporate Members who wish to be included in the Directory of Qualified Persons in the said field. Applications can be downloaded from the IESL Website or collected from the IESL Secretariat.

Please note that the closing date for applications is March 31, 2012 and a sum of Rs 1500/- is payable by the applicant in order to cover the cost of the directory.
Inventing the wheel – ignoring the Axle!

Once again, my editorial has been influenced by a very interesting article published in the March issue of the Scientific American titled, “Why It Took So Long to Invent the Wheel”. The author of the article makes some interesting observations on the time it took for man to invent the wheel as against the time he took to make other discoveries. The article notes that, by the time we started using the wheel in 3500 BC in the Bronze Age, man has already started casting metal alloys, constructing canals and sailboats, and even designing complex musical instruments such as the harps! Why is it then that it took us so long to invent the wheel?

He goes on to answer the question and says that “The tricky thing about the wheel is not conceiving of a cylinder rolling on its edge. It’s figuring out how to connect a stable, stationary platform to that cylinder”. The article, quoting David Anthony, a Professor of Anthropology at Hartwick College, goes on to say that the “The stroke of brilliance was the wheel-and-axle concept”

Thus, contrary to the belief that we invented the wheel, what our engineering forefathers may have actually done at that time was to figure out as to how to fix an axle to make use of a rotating wheel.

This takes my memory back to an interesting comment the late Dr Ray Wijewardene made about the Wright brothers, the inventors of the world’s first airplane. He said, the Wright brothers were not the first to build an aircraft but they were the first to master the art of controlling it. Thus, yet again, contrary to popular belief, what they have actually invented was the mechanism for aerodynamic control, which they claimed in their first US patent.

This shows us that what is important in Engineering is not just inventing or constructing things but getting what was invented or constructed to work in practice!

Facilitate Water Governance

by Eng. Nishantha Kamaladasa
CEO, Distance Learning Center Ltd

Many in the water sector in Sri Lanka believed that the reforestation is going to increase the water availability in a river basin and as such it is better to convert barren lands to forests. The recent video conference held at the Distance Learning Center Ltd, on Water Economics and Governance revealed that this belief needs to be revisited.

Video conference brought experts from Australian National University to the virtual class room at the Distance Learning Center. They were Professor Quentin Grafton, Director of the Center for Water Economics, Environment and Policy, Dr. Daniel Connell, Researcher and author of the book on Water Politics in the Murray-Darling Basin and Dr. Jamie Pitlock, Director of International Programs for UNESCO chair in Water Economics and Transboundary Governance. Distance Learning Center was able to offer the program to Sri Lankan Water Professionals thanks to the generous sponsorship of the International Water Management Institute (IWMI). Professionals from Mahaweli Authority, Irrigation Department, Ceylon Electricity Board, National Water Supply and Drainage Board and academics from Universities participated.

In the subsequent local discussion after the video conferences there was agreement that we need to undertake further research to support the water resource managers to take better and informed decisions.

It was also agreed that the type of the tree cover is a critical factor in reforestation and hence the necessity of further research on the same topic.

The Climate is changing and there is a necessity to mitigate global warming and every step need to be taken towards it. On the other hand some of the measures we adopt to reduce global warming, such as increasing tree cover, may reduce the water availability in a particular locality. Therefore we need to look at the environment as a whole than trying to manage its parts separately.

As our development initiatives create a chain of reactions, there was also agreement that the whole chain has to be studied to decide the feasibility of a particular initiative. This was a result of the exposure by Dr Pitlock, who elucidated that in Australia, subsequent to the adoption of rain water harvesting in a particular region there had been an increase in energy use. The research, he said, has revealed that a main supply would have consumed very much less energy than the individual households using inefficient pumps to distribute rain water. When the hydro power is used to generate the same energy, it amounts to waste of water in the name of preserving water which is also absurd. This particular outcome also emphasized that we need to look at water and energy together than looking at each separately.

It was discussed that in the past, civilizations followed the water but later with advanced technology water was made to follow the new seats of civilization, creating a variety of water and economic stresses though with other gains. Though in the current context we are free in selecting our seats of development irrespective of water availability, one has to consider the cost in such separation. Therefore the necessity of consulting water resources managers in development planning was emphasized. Contd. on page 11.

Following article was first published in “the Institute” magazine published by the IEEE

Beware: Free Apps Might Prove Costly

Research by an IEEE Fellow warns of malware on the prowl

By ANIA MONACO17 February 2012

You might want to think twice the next time you download a free app to your smartphone. That app could be riddled with malware able to steal information stored on your phone, according to IEEE Fellow Jeffrey Voas. It pays to be extra cautious now, Voas says, because mobile hacking is on the rise, with free apps possibly the most popular tool for gaining access.

Recent research by Voas, a computer scientist at the National Institute of Standards and Technology in Gaithersburg, Md., and his team of researchers found malware in more than 2000 free smartphone apps—and that doesn’t even account for the ones where the malware is so hidden it’s impossible to spot,” Voas says. “The number of malware-contaminated apps is growing by the day, and with most of the apps offering good functionality for free, it’s easy to be victimized.

Voas used a variety of detection tools—some commercial and possibly the most popular tool for gaining access.

Photo: Stockphoto

Contd. on page 11...
Three students (let us call them X, Y and Z) take up a final examination in probability and statistics and are keen to know the results before they are officially announced. It was known that only two of them had passed the exam but which two had passed was not known. Thus, as far as each one was concerned, the probability of passing was obviously 2/3.

X was very friendly with the office peon, who, as is usual in such cases, was in possession of the much desired results. But X was reluctant to ask him.

The other two begged X to talk to the peon and get the information because the suspense of waiting was killing them. But X said that he was too embarrassed to ask the peon about his own results. The others then told him: “OK, fine. Don’t ask about yourself, but at least ask him about our (Y and Z) results.”

X still refused to do that too, this time on the grounds that it would reduce the chance of him passing the exam from 2/3 to 1/2. His logic was like this: “Let us say that my friend says that only Z had passed. That would mean that the other one who had passed is either me or Y, (i.e.) one outcome out of a possible total of 2, making the probability of my passing 1/2. So you see, the answer would give me a lower chance of passing (0.5) than the 2/3 I have now. Sorry, people, no can do.”

Let us examine X’s logic in detail. Once it is known, for example, that Z has passed the exam, it leaves only 2 possibilities:

1. X passes and Y fails
2. Y passes and X fails

Consequently, the chance of X getting a pass is reduced to 1 out of 2 (or 1/2).

X’s conclusion looks correct on the face of it despite the fact that common sense tells us otherwise. Where is the catch?

This puzzle I based on a question in probability that I found in a book.

Happy Puzzleing to All!!!

Puzzle Guru Sarath Chandrasiri

ANNUAL SUBSCRIPTION FEES FOR THE YEAR 2012

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<th>Class of Membership</th>
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<tr>
<td>Student Member &gt; 35</td>
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</tbody>
</table>

International Professional Engineer (IntPeng) Subscription Fees excluding VAT: Rs 2,500/=.

Discounts

In respect of membership subscription fees, a discount of 25% apply to members other than Student Members who are above 60 years of age and who declare that their annual income is less than Rs. 600,000/=.

Solution for Puzzle No. 43
(The Last Last Will)

This winner for Puzzle 43 is Eng. Lanka Perera (AM 10750), who was the only one to send in a solution, which also happened to be the correct solution. The answer is as follows: The initial amount in the account was Rs. -7 million (the minus sign indicating an overdraft). Therefore, according to the method of subscription given in the last will, the 8 sons received equal overdrafts of 2 million each at the end of the process, which was passed on to their private bank accounts and hence deducted from whatever balances they had in them (a good lesson for their greed, as the father had planned). The only real beneficiary was the charity, which received funds equivalent to Rs 9 million, which eventually came from the private funds of the sons. Finally, the total liability passed over to the sons was Rs 16 million, consisting of the 7 million initial overdraft of the common account plus the 9 million paid to the charity.

Eng Lanka used a reverse regression procedure to find the solution, which happens to be the simplest approach. PG’s Comments: That was a very comprehensive solution, which is exactly what I would usually expect from Eng. Lanka. My only hope is that recognizing her talents, the Regime Change clique would not entice her to join their ranks in their campaign against PG.

The above puzzle is based on an article by the world famous Puzzle Guru, Martin Gardner, on an age old puzzle called the ‘Monkey and Coconuts’, where some people marooned on a desert island try to divide a heap of coconuts among themselves. In Puzzle 43 and the other two Puzzles dealing with similar Boodal problems published previously, the coconuts have been replaced by money in a bank account.

Before, I embark on the more relevant parts of my comments; I have to mention an article sent to me on a personal basis by none other than our Editor, (Thank you Mr. Editor), where the author talks about how the skills needed of modern engineers have been changed by the availability of software such as Autocad, Matlab and Maple.

If SLEN and the Puzzle Corner had existed at that time, engineers would not have had tools such as MS Excel to help them solve these Boodal and Mudal problems. They would have had to resort to trial and error methods as happened in the time of the Monkey and Coconuts puzzle long ago. They would also have realized that there was an infinite number of solutions of the form (S + nk), where S is any valid positive solution, k is an integer constant, (the difference between two adjacent solutions) and n is an integer parameter such as 0, 1, 2, 3 etc. (Already mentioned by some of our readers). The trick here is that k is very easy to find. Thus, once you work out one of the solutions, the full set can be found easily. The difficulty though is that of finding S (any one of the other valid solutions, the smallest being the relatively easily to find), which needs a lot of trial and error. All those who tried to solve it concentrated on the positive number solutions only. But since the lowest positive number solution was a four figure value, it was very difficult and time consuming to find it by trial and error.

However, what they did not realize was that there were also an infinite number of negative solutions, as found by Lanka in this specific case. I hinted at such solutions in the previous puzzles but no one caught on to it. Therefore, I was happy to receive this puzzle from Boodal Bedumrige which has only a unique solution that happens to be a negative number.

Once the existence of negative number solutions is realized, one can start searching in the negative direction in the hope that the first negative S may exist quite close to zero. In fact, such negative number solutions exist quite close to zero for the previous two puzzles too. The equation (S+nk) is valid for negative S and n as well. After finding the negative S that is closest to zero, for which n=1, one can easily emerge from the negative domain and arrive at the lowest positive solution we are looking for by substituting n=0 in the formula. That is the elegant solution I was looking for.

For those attacking the coconut problem, it would have been hard to come up with the concept of ‘negative coconuts’. But, long ago, one very smart person realized the possibility and a negative number solution of less than 5 in magnitude was found. Unfortunately, who it was is not known with certainty. There are no such things as negative coconuts in nature, unless one delves in to particle physics and come up with coconuts made up entirely of anti particles such as anti protons, positrons etc. But in the case of money and bank accounts, we are quite familiar with the concept of over drafts, which are simply made up of negative currency.

I hope this will not give new ideas to those who are in charge of finances who may get bright ideas such as paying us in negative rupees. Don’t worry about it though, because we can hit back at those pundits by paying our taxes and interests with negative currency. The mind boggles though, in trying to imagine how such a negative economy would work. Would those complaining about positive inflation take lightly to negative inflation? Would the change clique not entice her to join their ranks in their campaign against PG.

Anyway, when I received this Puzzle I thought it provides a nice way of introducing negative numbers solutions without directly mentioning them. May be those who are interested could now find such solutions.

Happy Puzzleing to All!!!

Puzzle Guru Sarath Chandrasiri

Correct answer must be sent by email to cebos@ceb.lk with copies to puzzleguru.lk@gmail.com. Please indicate your name, membership number and date of birth along with the answer. Also indicate the puzzle number in the subject line of the email. A list of readers who gave the correct answer along with the solution will be published in the April 2012 issue of the SLEN.
What is Email and How to protect your email account from Hackers?

by Eng. Tharindu Weerasinghe [Associate Member]

Email

It is hard to find a youngster who does not have an email account, in the contemporary world. Email has simply become the most widely used communication methodology over the internet. Since there are many free email services provided by Google, Yahoo, Hotmail and so on many people have email accounts which have storage around 2GBs. So, in this article I thought to give a basic overview of Emails first and then provide some vital facts on protecting your email account from hackers...

What is an email?

An email is an electronic message transmitted over a computer network (frequently the Internet) from one user to another. An email can consist of few lines of text or many lines of texts and some attachments like images, video clips, documents and so on.

Basic structure of an email:

Header:
The header comprises of the following information:
- Sender of the email.
- To whom the mail is sent.
- When the email was sent.
- The email subject.
- The size of the email.

Body:
The body comprises the following information:
- Contains the message.
- May also contain an attachment.

Attachments:
- If not embedded within the body, attachments are sent along with the email.

Most Commonly used Model of Emails:
- Client-Server Model

Most commonly used is the “Client-Server” model. It is described in a lucid and palatable way as follows:

- An email server is typically a combination of processes running on a server with a large storage capacity – a list of users and rules, and the capability to receive, send and store emails and attachments.
- These servers are designed to operate without constant user intervention.
- Should process emails for months as sending, receiving and maintenance tasks are carried out at scheduled times. The client only has to connect to the email server when it sends and checks/receives new email.
- Sometimes it may be permanently connected to the server to allow access to shared address books or calendar information – this is typical of a LAN-based email server.
- Most email servers conduct email services by running two separate protocols (a common agreement between the sender and receiver) on the same machine.
- One protocol is the POP3 (Post Office Protocol 3) server, which holds emails in a queue and delivers emails to the client when they are requested.
- The other is the SMTP (Simple Mail Transfer Protocol) server that receives outgoing emails from clients and sends and receives email from other SMTP servers.
- These two processes are linked by an internal mail delivery mechanism that moves mail between the POP3 and SMTP servers.
- When the client calls the email server to send or check for mail it connects to the server on certain TCP/IP ports:
  - SMTP on port 25
  - POP3 on port 110.
The Carrier Guidance Program for Final Year Undergraduate students in Faculty of Engineering, University of Peradeniya, organised by IESL Peradeniya Student Chapter in Collaboration with IESL Central Province and Global Talent Coach & Consultant (Pvt) Ltd. was held on 25th February 2012 at EOE Pereira Theatre with 200 numbers of participants. This was conducted by Mr. Jayantha Fenando who is the Director and Lead Consultant of Global Talent Coach and Consultant (PVT) Ltd. Eng. K Subramaniyam, Chief Guest and Resource Person of this session is introduced by Chairman Mr. Michael Valbuena expresses his views after the felicitation.

Technical Session on “Flood Mitigation and Water Resources Development in Trincomalee” held on 11-02-2012.

A Technical Session on FEDIC Condition of Contracts by Mr. Michael Valbuena, Team Leader of AFD Project was conducted by the IESL Eastern Centre on 21st January 2012. Sponsored by Bluescope Lysaght.

IESL Sabaragamuwa Centre

IESL Sabaragamuwa ToastMasters Installation and Induction Ceremony held at the CEB Holiday Resort, Kalawana.

Mr. Saleem (DTM) and Mr. Mohideen (AGM-CEB) being Received by the DGM Toastmasters badge wearing Presentation of certificates to ToastMasters Entertainment Session.

Eng. S Mohanrajah, Chairman of IESL Eastern Province delivering the welcome speech.
Power Transformer and Dissolved Gas Analysis
by Eng. M.Musthaffa Aliyar
Chief Engineer, Transmission Asset Management Branch, Ceylon Electricity Board.

The purpose of this article is to educate the readers on the concept of Dissolved Gas Analysis (DGA) of power transformers, which is a very effective tool used by asset managers to diagnose the overall health of transformers. Asset managers of CEB are responsible to achieve the maximum commercial benefit from the plant & equipment. To achieve this, monitoring performance of equipment and scheduling effective preventive maintenance are very important. In doing so, you can simply maximize the economic lifetime of assets.

Introduction

Power transformer is one of the most important components in a power system. It also constitutes one of the largest investments in a utility’s system. For this reason, transformer condition monitoring, condition assessment and preventive maintenance are of high priority. In several parts of the world the transformer fleet is operating beyond its design life and with higher average loads than before because of currently available effective diagnostic tools and proper maintenance. In Sri Lanka too, there are transformers operating more than 42 years without much troubles. Though several techniques are available, transformer oil sample analysis is a useful, predictive maintenance tool for determining transformer overall health.

In general, solid insulation in the form of paper is used to cover the coils of a transformer and liquid insulating material in the form of transformer mineral oils are commonly used for cooling purposes in all oil filled transformers. The breakdown of electrical insulating materials and related components inside a transformer generates gases within the transformer. In other words, during normal operation there is usually a slow degradation of the mineral oil to yield certain gases that collect in the oil. However, when there is an electrical fault within the transformer, gases are generated at a much more rapid rate. The gases arise in the transformer oils as results of transformer faults such as arcing, corona (partial discharges), over heating of transformer oil or overheating of paper insulation (cellulose) etc.

The identity of the gases being generated can be very useful information in any preventive maintenance program. That is to say the dissolved gases in transformer oil can be used to diagnose the faults experienced by the transformer. Dissolved Gas Analysis (DGA) of transformer insulating oil is considered the single best indicator of a transformer’s overall condition and is practiced universally today.

Key Gases

The two principal potential causes of gas formation within an operating transformer are electrical disturbances and thermal decomposition. Insulating mineral oils are mixtures of many different hydrocarbon molecules, and the decomposition processes for these hydrocarbons in thermal or electrical faults are complex. The fundamental chemical reactions involve the breaking of carbon-hydrogen and carbon-carbon bonds. During this process, active hydrogen atoms and hydrocarbon fragments are formed, which can combine with each other to form gases; hydrogen (H₂), methane (CH₄), carbon monoxide (CO) and carbon dioxide (CO₂). The gases mentioned above are generally referred to as key gases.

Analysis

After samples have been taken and analyzed using dissolved gas analyzer, the first step is to evaluate the concentration levels (PPM) of each key gas. Then values for each of the key gases are trended over time so that the rate of change of the various gas concentrations can be evaluated. Simply, any sharp increase in key gas concentration is indicative of a potential problem within the transformer.

The following table is derived from information provided within ANSI/IEEE C57.104

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<tr>
<th>Gas Description</th>
<th>Key Gas Concentration (in ppm)</th>
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Complexity Management
by Dr Gamini Kulatunga

I am quoting from “Reforming Complexity” a book based on Havana’s Instituto de Filosofía’s First Biennial International Seminar on the Philosophical, Epidemiological and Methodical Implications of Complexity Theory, held in 2002.

(a) When organizations succeed, it is mostly in spite of, not because of, the way they are organized.

(b) When organizations succeed, it is mostly in spite of, not because of, the way leadership is exercised

(c) The manner in which most organizational working units are organized, set up and managed serves more to stifle than to encourage the creativity and productivity of its members. (Jeffrey Goldstein, 1997)

Some more astute business observers (Block, 1987; Kotter, 1990; Mintzberg, 1994; Bartlett & Goshal; 1995; Hirschorn, 1997) have noted that the skill-sets evident in the best business leaders are not always dominated by the traditional notions of management (setting strategy, designing and partitioning tasks, measuring and reporting progress, assigning and controlling actions) and have more to do with ‘soft’, people-oriented skills like inspiring, empowering, listening and observing, understanding and coaching.

The traditional view of management considered organizations to be stable entities that functioned in a linear and predictable manner. This view was reinforced by Taylor, in the United States, and Favot, in France. Both considered the importance of applying predictability and control in an organization.

The present thinking based on complexity is quite different.

From Wikipedia

In general usage, complexity tends to be used to characterize something with many parts in intricate arrangement. The study of these complex linkages is the main goal of complex systems theory. In a business context, complexity management is the methodology to minimize value-destroying complexity and efficiently control value-adding complexity in a cross-functional approach.

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With a prestigious history of innovation and teaching excellence, University of Moratuwa produces multi-faceted graduates who think, create, and lead. Moratuwa’s exceptional faculty, with higher degrees from finest universities around the world, generates knowledge, and transfers technology to the industry, enhancing Moratuwa’s leadership as the center of innovation. Moratuwa graduates, who think and create, have the unique ability to match up with the ever-changing and challenging world.

University of Moratuwa offers rigorous bachelor’s, master’s, and doctoral programs in engineering, architecture, and information technology. The undergraduate program, which uniquely captures both the extremes of in-depth analytical skills and applications, helps graduates build careers. The world-class students by winning international competitions, readily securing employment inside and outside Sri Lanka, and introducing transformative changes in the industry. Moratuwa graduates do well at our own graduate school or top schools around the world, and become ambassadors testifying to the top-notch talent and finest quality of Sri Lankan graduates.

These remarkable victories signify several important facts: Sri Lankan students are highly talented, and in many instances, surpassing the talent pool in the world. On the other hand, University of Moratuwa is on a steady march toward becoming a premier academic enterprise in the region. These wins are very welcome news in an era happening once too often. However, there is a large fraction of students who, in fact, do justice to the tax-payers' money by doing their utmost to become the professionals the country needs. This is why the remarkable achievement of this group of students from University of Moratuwa is much noteworthy.

Robotics at Moratuwa took flight when the University started teaching robotics for the fourth-year students in 2006. Again, in 2006 we started a course named "Robot Competition" for the second-year students as a skill development module. This module teaches students robot design, sensor and motor interfacing, robot control techniques, and most importantly winning tips of robot competitions. This unique experience, far apart from the traditional University teaching, makes the students discover robotics on their own with minimal but carefully crafted guidance. Drawing from the engineering knowledge gained in the other modules, and benefiting from the unique Robot Competition course, in a very short period of time, students become designers and robot builders. This happens in a competitive, and a fun-filled environment. Department of Electronic and Telecommunication Engineering has an Intelligent Machines Laboratory for robotics research and development. The laboratory is financially supported by the National Science Foundation, Ministry of Defence, and Department of Wildlife Conservation. The laboratory collaborates with the National Research and Development Centre (NERD), as well. Moratuwa has consistently been taking part and winning international robot competitions.

Secondly, to win a competition, we should identify the task of the competition. We must read the problem statement carefully and get a clear idea about the competition. In any kind of competition, there are a set of rules. We must read those rules and understand them thoroughly. The next step is to think of a good design to complete the task. When choosing a design, there are several aspects that need our attention: 1. The design must conform to all the game rules. 2. The design must be practically implementable with the available resources. 3. Good-quality electronic and mechanical components must be used, although it may cost more.

One of the most important steps is making hardware or mechanical parts as possible as possible. A mechanically flimsy robot, like a sick child, cannot win a competition. We must use good electronic components, batteries, motors, and actuators. A healthy robot, then, is a good mechanical and electronic design, realized using good-quality components.

Moratuwa Robots....
1. Have a strong password: Password should not be your name, hometown, age, school name as personal information like those can be easily retrievable in the contemporary world with the growth of the internet, search engines and social networks. Password of your email account must be a combination of letters (abcd…), numbers (1234….) and special characters (@#$%...). There are several strong password generators available to help you pick a secure password. If you prefer to choose the password yourself, don’t use simple words.

2. Be aware of phishing scams: Never respond to an unexpected email or web site that asks for your personal information or account login details.

3. Always use https when logging into your email account:

4. Install firewall, anti-virus, and anti-spyware protection on your computer and keep them up to date: Automated updates for your virus scanner and regularly scheduled full scans for spyware is best. Windows users with newer computers can get Microsoft Security Essentials. Some commonly used standalone antivirus software that can be used includes Avast Anti-Virus, Norton Internet Security, and Spybot S&D. Windows users (not pirated copies) remember to let Norton Internet Security, and Spybot S&D. Windows users (not pirated copies) remember to let them up to date

5. Avoid logging into your accounts from un-trusted computers: Un-trusted computers include any computer that you do not maintain yourself. This includes high risk public computers such as the computers at cyber cafes, your local library, and un-trusted Wi-Fi zones but also includes computers that belong to your friends and family that could already be infected with spyware.

These tips will almost protect you being hacked but we can’t give you a 100% guarantee that your email account will not be hacked as there are intelligent and unethical, cunning eavesdroppers around the globe.

With a good design in hand, we “give intelligence to the robot”. This is done through programming the algorithms into the robot. Our algorithm should be planned according to the needs of task. Sometimes the design of a perfect or complex algorithm would not be necessary. For an example, assume that there is a 10x10 grid and 2 boxes are placed randomly on the grid. The task is to find the boxes and bring them back to the starting position. We may be tempted to go for complex algorithms to find the shortest path. In this case, that is not necessary at all. Because, there are only 2 boxes in the grid and all other 98 junctions are available for the robot to travel. Therefore going horizontally and then vertically is the shortest path in this case. But what if there were 40 boxes in the grid? Then it is obvious that we have to go for a complex algorithm. So we must use the simplest algorithm which can achieve the task in hand.

The utmost commitment of each of the team members is, perhaps, the most important ingredient. We should be willing to work hard, sleepless nights, foregoing food, etc. are the name of the game; but, that is how the winners are made. We should be competitive, willing to take challenges and really desire to win. Pain due to sacrifices when we see the robot running around. And even if we lose at the end, we must have gained a lot of experience worth for life: we have done a great job to give life to a lifesize lump of metal and plastics. Finally, we must keep this in our mind: “It is not what we know, that leads us towards victory. It is the way we use what we know.”

Recent iNexus 2011 Competition

In the recent iNexus 2011 competition, in which Moratuwa emerged victorious, teams had to build three types of robots: a maze-solving autonomous robot, a grid solving autonomous robot, and an optional manual robot. The grid solver had to transport the blocks (trapped team members) from the grid arena to the maze without the help of a maze solver. The maze solver had to traverse the maze and deposit these blocks in the three different zones in minimum possible time by avoiding nodes (enemy bases) and moving through bridges and then returning back to the starting position.

The competition task was described mimicking an intriguing and dangerous mission. Techfest 2011/12 brought this life threatening mission for iNexus in which the teams had to make a series of robots which should rescue the team through the ‘No Man’s Land’ and the enemy area and bring back the extraction point. In the competition, the central part of the arena was the ‘No Man’s’ Land and blocks represent the trapped team. The nodes in the maze are the enemy bases and had to be bypassed.

iNexus Task Description

“Unless mankind redesigns itself by changing our DNA through altering our genetic makeup, computer-generated robots will take over our world” - Stephen Hawking

Morina is renowned for its diversity and also for it being dangerous. After a successful rescue operation of 2 men to the CORE army bases, the team didn’t know they had a bigger volcano underground waiting to unleash itself. The enemy was well prepared than expected. They had all sort of weapons in their repertoire, the circulation of bazookas, the fiery Kalashnikovs and the state of the art laser tag guidance system to avoid any interference from the skies. Just a day after the rescue operation, CORE team was forced to evacuate the sector, the team was informed that an attack operation being planned on them. There was just enough time left to run. But a far more bitter truth lay in their way. A long No Man’s Land stayed in their path. There was the great river of Kha’zaddum on one side and the everlasting Andirondack Mountains on the other. Now there was a choice what to choose, the pathway through the sharp Andirondacks or the pathway through the fiery and the gushing white water rapids.

The team had to conquer the NO MAN’S LAND or perish in the forest.

The Sri Lankan leg of iNexus robot competition was held on the 14th of December 2011 at the Department of Electronic and Telecommunication Engineering premises, University of Moratuwa. It was a major event organized by the Electronic Club where the giants of electronics and robotics met at the same battle field. The robots, working in collaboration, had to collect 3 cubes while avoiding some hazards which were randomly placed in the arena. The teams had come up with innovative solutions to win.

The teams were selected to represent Sri Lanka at the Techfest 2011/2012 iNexus grand finale held on 6th January 2012. At Techfest 2011/2012 iNexus, eight selected teams from India, Sri Lanka and Australia competed for a single crown. Among them two teams from Sri Lanka managed to qualify for the grand finale along with one team from India and one from Australia. At the grand finale, one team from university of Moratuwa won the championship beating the Indian team while the other team managed to secure 3rd place beating the Australian team. This is an unprecedented win for Sri Lanka in an international robotics competition.

What is a Robot?

When someone hears the word “Robot”, what will be the picture drawn in his or her mind? Most often, a humanoid object having legs and hands with the capabilities of speaking and walking will be drawn in their minds. But “Robots” are not just humanoid objects. Manipulator arms seen in factories, mobile robots or robot vehicle are the other two kinds. Robots, then, are virtual or mechanical artificial agents, which are guided by a computer processor, or a controller. Robots are usually energized by electrical energy and, sometimes, gasoline. The robots move by using various kinds of motors. There can be a large number of sensors to obtain information of the environment. But “Robots” is no robot that has the ability to create or invent. “Robots” are still at a preliminary level when compared with the level intelligence of the human.

These students have shown us that the real fight is outside the university walls, outside our country, in the world arena. After fighting using their intellectual skills with the best around the world and emerging victorious, these students have proven a well-known truth; our indigenous talent is surpassingly good.

What must we do next, to help them make our county a better place?” is the question at hand.

Moratuwa Robots....

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As the value exceeds this limit, sample frequency should be increased with consideration given to planned outages in near term for further evaluation.

- **Insulation overheating:** When transformer is overloaded it generates high heat and deteriorates the cellulose insulation. In this case DGA results show high carbon monoxide and high carbon dioxide. In extreme cases methane and ethylene are at higher levels.

- **Insulation liquid overeating:** The overheating of insulation may lead to breakdown of liquid by heat and formation of high thermal gases. They are methane, ethylene and ethylene.

- **Corona:** It is a partial discharge and detected in a DGA by elevated hydrogen.

- **Arcing:** Arcing is the most severe condition in a transformer and indicated even by low levels of acetylene.

Once key gas concentrations have exceeded normal limits, other analysis techniques should be considered for determining the potential problem within the transformer. The techniques refer to the ratios developed by Doernenburg and these ratios to suggested limits. Some of the most commonly used techniques include the application of Doernenburg ratios, Ratiometric and Dowell Trigonal Model.

**Summary**

Though DGA gives good indications on health of transformers, potential problems within the transformers should not be limited to the concentration levels of the key dissolved gases. By trending the dissolved gas levels, problems can be identified and evaluated further before they cause a failure or the transformer. Key ratios are sensitive to changes from one sample to the next; one should perform another sample to verify the results of the previous sample. Once it is confirmed, preventive measures can be taken to resolve the problems.

**Contd. from page 8...**

**Power Transformer...**

Beware: Free Apps...

The person who wrote your app could wind up acting as your new, unauthorized system administrator of your phone,” he says. He or she can “take total control of your phone, including your GPS location, wireless connection, microphone, camera, and address lists. All your e-mail could be accessible.”

Another way to protect yourself is to pay careful attention to the access rights being requested by an app. When users download apps, they often must agree to give the app access to various features, such as GPS location. That is not necessarily a bad thing, but users should be sure they understand what they are agreeing to.

So what can you do to protect yourself against malware lurking online? What little, Voas says. But he does recommend caution.

First, download free apps only from sources you trust. The app store that you can look for apps is a good place to start. However, some have been known to do things like steal your personal information or charge your credit card without your knowledge. It’s always better to pay for an app than risk losing money or your online identity.

How would you stop our personal information from being stolen? One way is to use a virtual private network (VPN). This creates a secure tunnel between your computer and the internet, so that all your online activity is encrypted. This makes it much harder for hackers to intercept your data.

Another way to protect yourself is to use strong passwords for all your online accounts. Make sure to use a mix of upper and lowercase letters, numbers, and symbols.

**Contd. from page 4...**

**Facilitate...**

The current Sri Lankan water resource development agenda is controlled by the riparian rights. Any new developer has to first ensure that traditional users get the traditional supply of water before embarking on a new development initiative. Provided such is done, any developer is free to develop any river source earlier you enter into a basin and start developing it (without the traditional users) you get an advantage, a right to claim for whatever you have stolen. The economics or any other factor suggests reallocation, it is not non-existence. Hence it is done only through negotiations with political hierarchy having the final say.

Herein private sector has to piggyback on politicians to enter in to the picture if they seek reallocation. It eventually creates a “black market”.

One of the key points discussed was how this situation could be changed so that market forces can reallocate water from inefficient sectors to more efficient sectors. It was also agreed that water needs to be considered as a right of all humans and that it cannot be left alone to the market forces to control. It was specially emphasized that the marginal groups like women and children, both in rural and urban areas respectively, to access the calculation and display of some of the diagnostic tools.

**Summary**

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