

Ottawa Chapter Newsletter

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SRE OTTAWA CHAPTER

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POINT OF VIEW

Remember the good old days? I regularly get emails listing prices and practices from the '50's and '60's that bring back nostalgic feelings from my younger days. Life was simpler then. Here is link to a brief history of how the profession of reliability engineering arose.

<http://theriac.org/DeskReference/PDFs/2011Q1/2011Q1-article2.pdf>

What about Milspecs? Remember when the US Military developed many standards for reliability engineering, like MIL-STD-217 Reliability Prediction of Electronic Equipment and MIL-STD-1388 Logistic Support Analysis? Then came the infamous "Perry Memo" in 1994 that directed the US military services "to use performance and commercial specifications and standards in lieu of military specifications and standards, unless no practical alternative exists to meet the user's needs."

<http://sw-eng.falls-church.va.us/perry94.html>

Thus began the era where organizations like ASME, SAE, IEEE and ISO picked up the reins, and began developing and marketing standards to replace the reliability Milspecs that may have been overly prescriptive but were more or less universally available and free.

It's been nearly 20 years since the changeover and one thing is certain – the pace of change has quickened, and standards likewise. Just consider how fast telephone capability is advancing, for example. Of course there is tension between the desire to meet a standard that everyone recognizes or a potentially lucrative proprietary solution. Think Microsoft versus Apple. But isn't that the point – choice is what matters, and the competition that choice engenders drives innovation. But we can still reminisce about those good old Milspec days!

- James Menard

SRE INTERNATIONAL NEWS

RAMS just finished and the SRE held its annual meeting. An audio recording of the meeting is available, and we hope to get CDs of the RAMS proceedings soon.

2011/12 OTTAWA SRE TECHNICAL PROGRAM

Here are the remaining presentations for 2011/12:

- 29 February 2012 Kouroush Jenab, Ryerson University, Software product improvement.
- 28 March 2012 Glenn Murphy, DND, Condition-based maintenance of marine diesel engines.
- 25 April 2012 Speaker tbd, Plasco, Progress in waste engineering - changing the game.

MEETING LOCATION

The Billings Room at Ottawa City Hall is on the second floor at the south end, towards Lisgar. Parking is available underground, or on the street. Meetings are held on Wednesday evenings, usually the 4th or last Wednesday of the month. Timings are:

6:30 p.m.	Door is opened, light refreshments
7:15 p.m.	Presentation
8:00 - 9:00	Questions and Discussion

IS THERE A FAILURE MODE FOR THIS?

If you are in the electric motor business you probably have analyzed possible failure modes, including overspeed. In an industrial setting, control of motors takes place in a centralized control station through distributed real-time software. Enter the stuxnet virus that apparently selectively infected certain Siemens systems that were thought to be used by Iran for uranium enrichment. According to reports, the virus monitors the frequency of the attached motors, and only attacks systems that spin between 807 Hz and 1210 Hz. When certain criteria are met, it periodically modifies the frequency to 1410 Hz and then to 2 Hz and then to 1064 Hz, and thus affects the operation of the connected motors by changing their rotational speed. It also installs a rootkit that hides the malware on the system and masks the changes in rotational speed from monitoring systems. The virus was so successful that it apparently destroyed over 1,000 centrifuges and significantly crippled the Iranian program. But now the genie is out of the bottle and available on the internet. Who might be targeted next?

<http://en.wikipedia.org/wiki/Stuxnet>

ATM RELIABILITY

We've all heard stories about ATMs paying out orders of magnitude more money than they were supposed to. Considering how many ATMs there are worldwide these are rare events and ATMs, or rather the banks that manage them, enjoy high reliability. After all, the financial consequences of incorrect machine operation provide a strong incentive to minimize malfunctions.

ATMs and their supporting electronic financial networks are generally very reliable, with industry benchmarks typically producing 98.25% customer availability for ATMs and up to 99.999% availability for host systems, according to an enote report.

http://www.enotes.com/topic/Automated_teller_machine#Reliability

As moderately complex systems, ATMs have many failure modes. Errors may be mechanical (such as card transport mechanisms; keypads; display; hard disk failures; envelope deposit mechanisms); software (such as operating system; device driver; user interface); communications (connectivity, encryption); or operator error, such as incorrect denominations of banknote being loaded in the money cassettes.

Here is an example one of hundreds of error codes, listed for just one ATM model:

Error Code: 322(46h)[F]

Description: Main motor failure

Recommended Action:

Error code 322 is generated when the main motor fails to reach normal speed within a specified time, or if there are several pulses missing from the transport clock wheel (timing wheel) in one transaction. This error code causes an "Out of Service" condition. Open all access panels and remove any jammed documents from the transport path. Verify the documents are fit for dispensing. Inspect the note qualifier for any damage (i.e. broken belts, broken gears, disconnected or damaged cables, broken timing wheel etc.). Make sure all access panels are closed. Restart the cash dispenser and reset the error. Complete several test dispenses. If cash dispenser operates normally when performing the test dispense function, put the cash dispenser in service. If the error code repeats, verify the power supply output voltages are within expected values. Replace the power supply if necessary. If the power supply is operating normally, replace the note qualifier to correct the problem.

http://www.atmexperts.com/atm_error_codes.html

Insight into the considerations for communications reliability is provided in an article on the reliability of connected systems.

<http://msdn.microsoft.com/en-us/library/bb245677.aspx>

Given the amount of cash stored in ATMs, it's no surprise that they are prime targets for criminal acts, ranging from brute force smash-and-grab techniques, to card skimmers, to sophisticated cyber attacks. Identity theft from physical card and PIN stealing, card skimming and high resolution hidden cameras is becoming more common according to the RCMP.

<http://www.rcmp-grc.gc.ca/pubs/ci-rc/if-fi/if-fi-eng.pdf>

One emerging technology in the struggle to combat identity theft and fraud is **biometrics**. A NATO sponsored study on the usability of biometric security systems found that 80% of the respondents to a Canadian survey think that biometric systems will be commonly used in the next 10 years.

<http://www.rcmp-grc.gc.ca/pubs/ci-rc/if-fi/if-fi-eng.pdf>

In India, since 2010, two hundred million people and counting have voluntarily participated in a unique identity (UID) program aimed at storing trustworthy, unduplicated identity numbers based on biometric and other data. Initial results show faster service and an impressive reduction in fraud compared to the alternative paper-based system.

<http://www.economist.com/node/21542814>

Any recognition system must be concerned with the False Acceptance Rate (FAR) and False Rejection Rate (FRR). In addition, biometric recognition must address Failure to Acquire (FTA) where the technology is unable to detect the desired attribute and Failure to Enroll (FTE) where the attribute is not universally measurable, for example when fingerprints are worn off through years of work. [http://cups.cs.cmu.edu/courses/ups-sp06/slides/060411.ppt#256,1,Usable Biometrics](http://cups.cs.cmu.edu/courses/ups-sp06/slides/060411.ppt#256,1,Usable%20Biometrics)

RELIABILITY IN THE NEWS

In a recent inspection, four of six diesel engine blocks in the Canadian Coast Guard icebreaker *Amundsen* were found to have cracks, causing cancellation of its entire 2012 scientific support season and putting at risk a government grant of \$67.3 million for Arctic research. Details are unavailable but speculation is centering on the troubled history of the type of engine fitted in *Amundsen* and sister ships. Ironically, the icebreaker is featured on the new fifty dollar bill. And just to rub salt in the wound, a promo film tour of the engine room by the Chief Engineer was posted on youtube last year. It sounds like a good case for condition-based maintenance – be sure to come to the March presentation to hear where the Navy is heading.

<http://forum.shipspotting.com/index.php/topic,9688.0.html>

<http://www.youtube.com/watch?v=zxKH6RRKK-Q>

MORE ON ENGINE FAILURE

An airliner is flying across country, when the pilot comes on the PA to announce, "We have some bad news. One of the engines just failed and as a result, we will be delayed by 30 minutes."

A bit later, the pilot reports, "We have some more bad news. Another engine just failed, and we will be delayed an additional hour."

Another bit later, "Sorry folks, more bad news. A third engine just failed, and so, since we will be running only on the one remaining engine, the flight will be delayed by another two hours."

At this point, a disgruntled passenger turns to his neighbour and says, "I sure hope that last engine keeps working or we'll be up here all night!"

<http://mistupid.com/jokes/page127.htm>

SREO Newsletter

If you have a topical issue or commentary you wish to share with the Ottawa SRE community, please send it to James Menard menardsj@sympatico.ca. Deadline for the next Newsletter is Aug 31, 2012. Thank you

