

# ceasa

THE CLINICAL ENGINEERING ASSOCIATION  
OF SOUTH AFRICA

Shedding a light with LED

-Nanotechnology-  
Small things making a  
big impact

Top 10 Hazards



HOW TO...



*Racing with  
Robotics*

CEASA  
NATIONAL  
NEWS

THE VOICE OF CLINICAL ENGINEERING

Check out our Website: [www.ceasa-national.org.za](http://www.ceasa-national.org.za)

## President's Letter



National CEASA President  
Phillip Willmot

I would firstly like to thank my predecessor Hendrik Radyn for his sterling work in leading CEASA for the past 2 years. Hendrik is now in the role of National Council Secretary.

James Herbert was also appointed as Vice President for the next 2 years. James has always been a great supporter of all things CEASA. Another regional change is Gauteng. It is now chaired by Lizanne Heyns and ably supported by a new fresh committee, with Mohamed Bera in as Vice Chairperson. New members can be seen on our website.

Welcome again to 2011. I would like to share what is planned thus far for the year. Let's start with this being our big year with the Joint Congress from 6 – 8 April at the Birchwood Hotel and Conference Centre near O.R. Tambo airport and East Rand Mall in Boksburg. The planning has been amazing and extremely hectic. We have full support from the trade and most, if not all, stands are sold. Attendance numbers will be great as will the talks, extremely varied and running in 3 streams.

Also included are some debates for open discussion and these interactive sessions are always very interesting. The final program will be mailed to all interested parties by SBS. Anyone wishing to obtain more information or contribute in any way, please contact Natalie on [natalie@sbs.co.za](mailto:natalie@sbs.co.za). Local meetings in all regions will also continue and these dates and places will be available from your local chairperson or from Gerda Toms, the Gauteng administrator on [ceasagauteng@gmail.com](mailto:ceasagauteng@gmail.com). A business breakfast will also be planned at regional level.

ECSA (Engineering Council of SA) are also putting an emphasis this year on the registration of Medical Equipment Maintainers (MEM) and this will be launched I believe at the congress and forms part of the Panel Discussion led by Johan van Roon, so any questions relating to the issues of registration, legal and other, can be posed at this forum.

If not already received, local offices will be sending out your 2011 renewals for personal and corporate memberships, so please ensure these are resolved amicably, as only once paid will the certificates be issued, valid only for the year. Please also understand that these cannot always be done in a hurry when needed, so please allow 5 working days for processing. It is also appreciated that you mention to friends and colleagues the ideals we have and why it is great to join the association, just a few points mentioned here as stated by a long standing member of CEASA to another possible enquiry, just in passing, so pretty amazing off the cuff I think:

*We keep up with the latest technology, holding members meetings every 2 - 3 month; we have a biennial joint congress;*  
*We create a network for Clinical Engineers to share ideas and opportunities;*  
*It is a Network of CE's you can use for advice on any issues that come up being from a hospital point of view or from the industry in general;*  
*We work closely with SAFHE, an even a bigger network of expertise to tap into when needed from a building and facilities point of view;*  
*We are the voice of the industry and when there are new Government legislations we can stand up for CE;*  
*We make sure the universities (old Technikon's) produce qualified people we can use;*  
*We have a Web site with amazing info, advertising and job opportunities;*  
*We are represented at ECSA (Engineering Council of South Africa) to make sure we look after CE Interests;*  
*We have Quarterly newsletter with market updates, trends, new products, opportunities, etc;*  
**ALL FOR ONLY R10.00 A MONTH :), NOT BAD I SAY**

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Having said that, we feel this is a great forum to be a part of and as an NGO and NPO. We are hoping this year to also support some member students with bursaries, assist with practical P2 training needs for students, maybe even throw in a Fun Day to get everyone together. There is a lot to look forward to so please join in getting CEASA to be a part of your life. This network of people is amazing.

Thanks and looking forward to seeing all somewhere through the year.

**Price**

## Technology Updates

Source: Institute for Futures Research - University of Stellenbosch

### Robotics

The world's first marathon for robots took place earlier this month. The *Robo Mara Full* 42.2km race was only open to androids with 2 legs. Five bipedal machines began the 422 lap race on a 100m indoor track in Osaka, Japan, but one of the competitors retired after finishing only the first lap. The rest continued running day and night. A 40cm tall robot, named Robovie-PC, won the event beating its closest rival by a single second after more than 2 days of racing. The organisers hope that the event will become a benchmark for the advancement of humanoid robots.

### Energy

Philips announced that their Ambient LED 12.5W light bulb, providing as much light as an incandescent 60W bulb, became the first LED light bulb of this type to attain Energy Star qualification. Energy Star sanctioned products are usually eligible for utility rebate programme that can lower the cost of a product for consumers. According to Philips, the bulb lasts 25 times longer, uses 80% less energy than the 60W incandescent bulb and is also recyclable. Philips is bullish on the LED market, in forecasting that LEDs will take 50% of the residential lighting market by 2015.

### Transport

An alcohol-detection prototype that uses automatic sensors to instantly gauge a driver's fitness to be on the road has the potential to save thousands of lives. QinetiQ demonstrated the system that measures whether a motorist has blood alcohol content above the legal limit and, if so, prevents the vehicle from starting. The technology is being designed as unobtrusive, unlike current alcohol ignition interlock systems that require operators to blow into a breath-testing device. The method uses sensors that measure blood alcohol through the skin using sophisticated touch-based sensors placed strategically on the steering wheel. The method eliminates the need for drivers to take any extra steps, and those who are sober would not be delayed in getting on the road, researchers said. The system is envisioned as optional equipment in future cars but is about a decade away from commercial use.



LED - the small, efficient, bright light at the end of the tunnel.

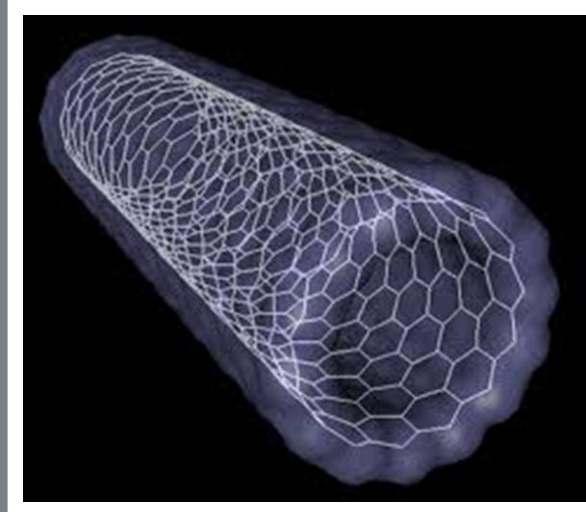
### Medical

Surgeons have to avoid injuring nerves during surgery as a stray cut could lead to muscle weakness, pain, numbness, or even paralysis. Scientists at the University of California, San Diego have announced a new method for lighting up nerves in the body with fluorescent peptides, which could act as markers to keep surgeons away. The researchers injected their peptide that illuminates nerves under a particular wavelength of light, into the bloodstream of mice, and found that all peripheral nerves (those outside the brain and spinal cord) were 'labeled' within 2 hours. The effect lasted for several hours, and was completely gone after a day. The researchers also tested the substance in human tissue samples and confirmed that it would also bind to human nerves. The technology could be very useful during complex cancer surgery by helping a surgeon to remove a tumor while avoiding the nerves around it.

## Technology Update

### Nanotechnologies

For more than a decade, nanowires and nanotubes have promised to shrink computing to scales impossible to achieve with traditional semiconductor materials. But there have been doubts about the practicality of nanowires and nanotubes as actual computing systems. In a significant breakthrough a team led by Charles Lieber, a professor of chemistry at Harvard, and Shamik Das, lead engineer in MITRE's nanosystems group, has designed and built a reprogrammable circuit out of nanowire transistors. To date the challenge has been reproducing structures made from nanowires and nanotubes reliable, since every structure needs to be identical to ensure that a circuit operates as intended. But now, says Lieber, the problem is being solved with the development of a technique to produce identical nanowires in bulk. Traditional chips are made using a so-called top-down approach in which a design is essentially or imprinted onto a semiconductor wafer followed by an etching away of the excess material. The new bottom-up approach developed means they can be deposited on various types of surfaces, and can be made more compact. The resultant devices could operate inside microscopic, implantable biosensors, and ultra-low-power environmental structural sensors.



A nanotube. The modern day miracle that you can't see with the naked eye

### Did you know?

#### About Modern Medicine

Although Galen (131-201 A.D.) and Hippocrates (460-377 B.C.) were the first physicians to document the healing process of their patients, the modern day usage of recorded information for medical technology did not begin until the end of the 19th century.

In the beginning of the 20th century medical technology became revolutionized, using tools such as stethoscopes, microscopes, thermometers and X-ray machines.



**-The revolution of medicine -  
Because putting your ear on someone's chest is so  
19th Century**



## Defibrillators Decoded

Source: <http://www.stanford.edu/group/bionexus/cgi-bin/bmesdrupal/node/23>

Technology, making the rapid progress that it does, seems to have taken defibrillators to the next level once again. In early stages, these heart-reviving machines were only meant for external use and gradually internalized within the last fifty years. A recent study by Dr. Gust H. Bardy and his team from the Seattle Institute for Cardiac Research was published in the New England Journal of Medicine, indicating the development of defibrillators without electrical wires.

Researchers hope that this technological advancement in implantable defibrillators will help to reduce replacement rates, scarring, complications, and deaths. Nearly 10,000 patients per month receive a device, and the improvement would hopefully significantly reduce those patients' complication risks. Not only are benefits increased, but the costs should remain relatively stable. It would be much easier to implant, and that could potentially mean a savings in health care costs. The downside, however, is that not everyone would be able to reap the advantages of the new defibrillator. Only about 25% of the patients who currently have a device would be suitable candidates for the newest one.

Much more extensive research must be continued before any implementation into the US can be established, and though it seems that Bardy and his group are on the right track, we must ask some questions.

### **How much risk will really be reduced?**

In the publication of Grady's research, it indicates that the relative risk of death is decreased by 23%. However, it goes on to state that the DEFINITE trial of patients with implantable cardioverter defibrillator (ICD) or standard therapy did not have a significant survival benefit, which is somewhat conflicting. Also, another factor that plays a critical role is the type of programming the device utilizes which may or may not lead to further benefits.

### **And since only one-fourth of the defibrillator-using population can use it, how would it become more equitable?**

If this technology takes off, it would be beneficial for a majority of the target population to be able to have it. Those who require pacemakers, have a ventricular tachycardia (VT) rate less than 170 bpm, or have recurrent, monomorphic VT that typically terminates with antitachycardia. These patients are not considered eligible candidates, but Dr. Bardy doesn't think that this group will expand very much.

### **What are the potential complications?**

Of the 829 patients that had ICD therapy, implantation was unsuccessful in just 1 patient. Significant complications occurred in 5 percent, and many patients that were on just drug therapy crossed-over to the ICD therapy. These seem like relatively low numbers with not a lot of risk attached to them. One of the major considerations is inappropriate shocks. They are uncomfortable, to say the least, but Bardy believes that they will decrease in number or have no effect on the patient whatsoever.



A Harvard Medical School study has determined that rectal thermometers are still the best way to tell a baby's temperature. Plus, it really teaches the baby who's the boss.

**Tina Fey**

## ECRI INSTITUTE'S TOP 10 TECHNOLOGY HAZARDS FOR 2011

Each year, *Health Devices* publishes a list of the 10 technology hazards that hospitals should be paying the greatest attention to, along with recommendations for alleviating the risks. Here's the list for 2011.

1

**Radiation overdose and other dose errors during radiation therapy** Radiation therapy errors can take the form of delivering the wrong dose, treating the wrong site on the patient, or treating the wrong patient. Human error and software problems have been cited as some of the causes.



2

### Alarm hazards

Alarms can become overwhelming to the extent that caregivers become desensitized to them or inappropriately inactivate them in an attempt to reduce the alarm overload. Remedies include establishing protocols for setting, responding to, and modifying alarms.



3

### Cross-contamination from flexible endoscopes

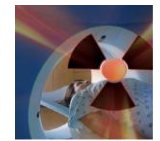
Contamination—with the potential for widespread infection of patients—is almost always the result of failing to perform correct cleaning and disinfection/sterilization.



4

### The high radiation dose of CT scans

Only in the past few years has the high dose delivered by computed tomography gained the attention it deserves. Prudent referral practices, close attention to imaging protocols, and smart technology selection are among the key steps for keeping doses in check.



5

### Data loss, system incompatibilities, and other health IT complications

As computers become more embedded in healthcare, IT-related hazards are increasing. Careful planning and management of computerized medical devices, information systems, and other IT-related technology and equipment is essential, as is good communication between IT, clinical engineering, and caregivers.



6

### Luer misconnections

Luer fittings can allow the connection of lines and tubing that weren't meant to be connected. Purchasing policies should include consideration of products that provide misconnection safeguards, and work practices and training should help users avoid inappropriate connections and discourage the use of adapters to connect incompatible fittings.



7

### Oversedation during use of PCA pumps

Patient-controlled analgesic pumps are often used to deliver potent opioids, so it's important that patients not receive too much medication. A pump with a good dose error reduction system is a must, and it's advisable to keep a close watch on the patient's condition.



8

### Needlesticks and other sharps injuries

Needlestick injuries continue to be a serious problem in hospitals. Sharps safety programs can only be effective if they receive continued attention. If you haven't revisited your program in a while, you should.



9

### Surgical fires

Surgical fires occur in the United States an average of twice a day. Most are minor, but a few are devastating. Avoiding open delivery of 100% oxygen during head and neck surgery is the key step in preventing the majority of surgical fires.



10

### Defibrillator failures in emergency rescue attempts

If you're not performing the necessary checks and maintenance on your defibrillators, you increase the odds that one will fail just when you need it. Something as simple as forgetting to plug in the defibrillator to charge the battery can make a life-or-death difference.



## How to guide

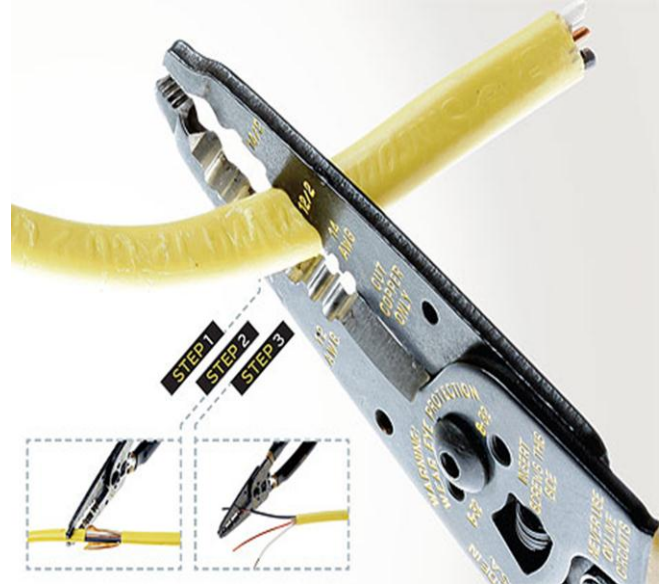
### Stripping Cable

A few basic tools and a deft touch are all you need to do this work.

**Stripping a wire** is about as basic as mechanical work gets, but it's surprisingly easy to damage a conductor as you remove its insulation or the sheathing over the insulation. Doing so creates a vulnerable point in a home's electrical system -- and a fire hazard. When a branch circuit gets knocked out, a light fails, or a recently installed switch or outlet doesn't work, it's not unusual to find a damaged wire at the root of the problem -- once you've tediously checked every connection. As an electrician, I see it all the time.

Damage can occur in one of two ways. First, if you nick a conductor, that tiny notch forms a point of stress concentration and failure. Second, copper can be damaged by a process called work hardening. Bending copper back and forth, or clamping down on it with excessive force, creates a hard and brittle area. As the damaged wire goes through the heating and cooling process caused by current flow, it will weaken. Eventually it will fail, either at the point where the wire is clamped under a terminal screw on a switch or outlet, or where the wire is twisted together with other wires using a wire connector.

And the moral of the story? When stripping wire, use the right tools and a light touch. Also, take a few practice cuts first.



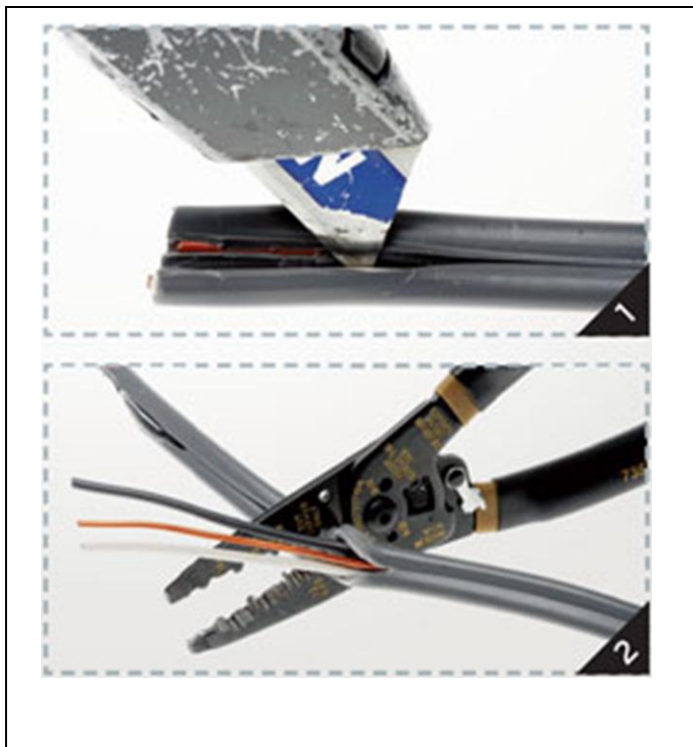
#### NM (NONMETALLIC) CABLE

By far, the most common cable that a homeowner will have to strip is interior-rated NM, usually in 14- or 12-ga. sizes. This easy-to-work product is sheathed with vinyl, and is often referred to as Romex, the name given it in 1922 by the Rome Wire Co. in Rome, N.Y. To strip NM cable, sever its sheath [1], then push and pull the sheath off and clip off the paper wrapping [2]. Using the correct notch on the stripper's jaw cut the insulation on the outside of each wire [3].



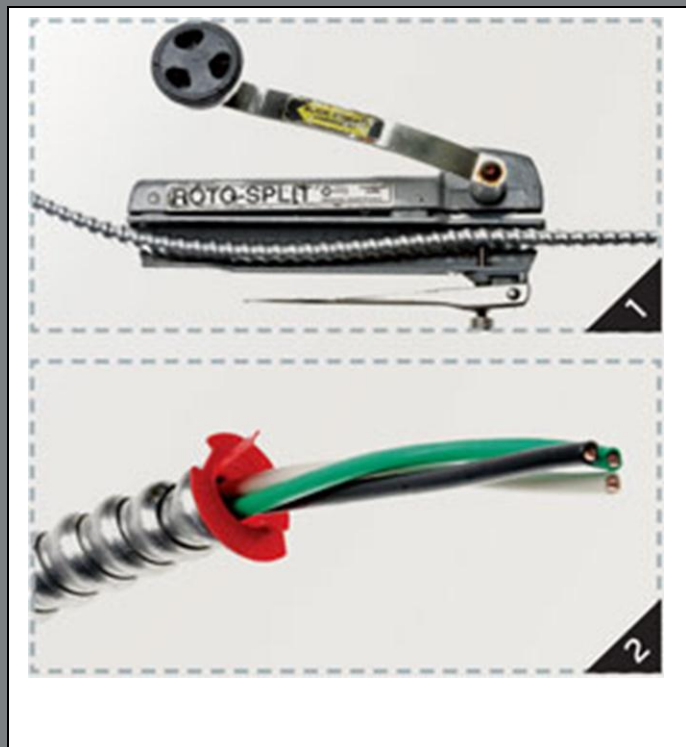
-Continued-

## MC (METAL-CLAD) CABLE



Use a utility knife and carefully slice the cable sheath along the bare copper ground wire located in the cable's center [1]. Then, bend back the solid plastic sheath, and pull the wires out one at a time. When the correct length of wires is exposed, clip off the sheath with the cable stripper's shears [2]. Spread the wires apart, and strip the insulation using the method shown above for NM cable.

## MC (METAL-CLAD) CABLE



With the cable clamped in a rotary cutting tool ([seatekco.com](http://seatekco.com)), turn the handle until the cutting wheel slices the metal cladding [1]. Twist the cladding off, and strip the wires as with NM cable. Insert an anti-short bushing [2]. Using a bushing on MC is not required by the National Electrical Code, but it's good practice. It protects the wires' insulation from damage by a rough edge on the cladding.

## Regional Upcoming Events

### Western Cape

May	Go-cart racing
August	Annual winter barn dance
December	Business breakfast

### Gauteng

April	SAFHE/CEASA Congress
May	Member meeting
August	Breakfast and Meeting

## Regional News - Western Cape

The CEASA Western Cape branch closed off their activities for 2010 with a business breakfast at the Parrow golf club on the 2<sup>nd</sup> of December 2010. The business breakfast has become an annual event and members are all looking forward to it all year. This event is held in partnership with SAFHE and contributes to the good working relationship between the two organizations in the Western Cape.

The event was very well supported and 140 delegates attended. The main speaker was Prof. Mark Swilling who is the Program Coordinator: Sustainable Development and Management in the School of Public management and Planning at the University of Stellenbosch. He is also the Academic Director of the Sustainability Institute and a well-known and respected speaker in his industry. Prof. Swilling gave a thought provoking talk on the Challenge of Sustainability, which is a topic will require our focus and attention for years to come.

Kevin Poggenpoel provided a short update on SAFHE activities and James Herbert updated the audience on CEASA activities and highlights of the year. Hereafter the breakfast followed which was enjoyed by all.

The proceedings were concluded with prize giving and lucky draws and a holiday spirit existed so close to the end of the year.

On behalf of the CEASA Western Cape committee I would like to thank you all for your attendance and extend a special word of thanks to the organizations that sponsored some prizes for the lucky draws. See you all again at the breakfast in December 2011!



Right: CEASA and SAFHE members at the business breakfast