



May 2012

**Inside this issue:**

<a href="#">IEEE-USA Annual Conference</a>	1
<a href="#">Spring Event</a>	1
<a href="#">A Day without Electricity</a>	3
<a href="#">National Robotics Week</a>	5
<a href="#">GOLD</a>	6
<a href="#">Outstanding Large Section</a>	6

**Special points of interest:**

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## Stay to the Right ... Except to Pass

My attendance at last week's IEEE-USA annual conference was a welcome stimulant to plans for the next phase of my technical career. As my article title suggests, there exists an IEEE lane for those comfortable with the status quo but, to me, IEEE-USA is an innovation institute. Not only encouraging advances in technical activities (the right lane), IEEE-USA is also leveraging the proven ability and character of its members and encouraging us to Create the New (the passing lane), with the confidence that we'll probably find value in the endeavor.

To paraphrase a famous quote:

*Innovation does not change the lives of technical professionals like us; Innovation is how we make our living!*

I shall pursue career 'experiments' to prove/disprove my new hypothesis. Program successes will depend upon the previously mentioned ability and character of IEEE-USA members. I'm optimistic because I've seen the passion of intent and the tenacity of purpose in IEEE members that is required for satisfaction. IEEE-USA guides our moves into the passing lane with programs and tools encouraging entrepreneurship, adaptability, effective communications, critical thinking and collaboration across networks.

Let's take inspiration from both the tactics of surviving species as well as from the initiative of the classroom disruptor (which includes NetSuite), and I'll see you in the passing lane!

- Cliff Alston

Treasurer, IEEE Denver Section

Join us and attend the next Denver IEEE ExCom meeting at:  
 **DeVry University                      1870 West 122nd Ave Room 121**  
 **June 12                                      6:00 pm—8:30 pm**

## IEEE Members Tour the NOAA Campus for the Spring Event

*"The sun is a mass of incandescent gas  
A gigantic nuclear furnace  
Where hydrogen is built into helium  
At a temperature of millions of degrees"  
- They Might Be Giants*

That's what you discover when you visit the Space Weather Prediction Center (SWPC) at the National Oceanographic and Atmospheric Administration (NOAA) David Skaggs Research Center in Boulder. The Denver Section began its Spring Event last month by touring NOAA, enabling 50 IEEE members and guests from across the Denver/Boulder metro region to tour the NOAA campus and visit a number of amazing weather-related research and operations programs including:

[Space Weather Prediction Center \(SWPC\)](#)  
[Earth Science Research Lab \(ESRL\)](#)  
[Climate Monitoring and Diagnostic Lab \(CMDL\)](#)  
[Weather Forecasting Office](#)  
[Science on a Sphere \(SOS\)](#)

## IEEE Members Tour the NOAA Campus for the Spring Event cont.

Our group of 25 was escorted through NOAA by Dr. Don Mock, Executive Director of Boulder campus. In the span of 90 minutes, we received a 'master class' in climate science that ranged from Coronal Mass Ejection (CME) to the Graphics Process Units (video accelerators used for computer based Weather Display) and included:

**Advanced Weather Interactive Processing System (AWIPS)** - a technologically advanced information processing, display, and telecommunications system that is the cornerstone of the National Weather Service (NWS)

**NOAA Profiler Network** (<http://www.profiler.noaa.gov/npn/>) a wind monitoring network which consists of 33 unmanned Doppler Radar sites located in 18 central US states and Alaska and provides hourly vertical wind profile data.

**Climate Monitoring and Diagnostics Laboratory (CMDL)**, which conducts research related to atmospheric constituents that are capable of forcing change in the climate of the Earth or that may deplete the ozone layer. CMDL monitors greenhouse gases, aerosols, ozone, ozone-depleting gases, and solar and terrestrial radiation at global sites including four Baseline Observatories.

The highlight of the tour was a presentation in the Science on Sphere (SOS) observatory, which was developed by Dr. Alexander MacDonald. Since 2004, SOS has been deployed to 60 U. S. and international science and education institutions. As part of the Earth Science Research Lab, SOS is a global system that uses computers and video projectors to display planetary data on a six-foot diameter sphere, analogous to a giant animated globe. During the SOS demo, Dr. Mock presented different world climate views that highlighted the causes and effects of the annual Hurricane Season (across the Atlantic into the Gulf States), the 2-day global impact of the 2004 Indian Ocean earthquake/tsunami, long-term effects of greenhouse gases on the Earth's atmosphere, and continuous traffic patterns of airline traffic across the US-Europe air lanes.



Science on a Sphere



By the end of the tour, our view of the advancements and challenges of Weather Operations, Climate Modeling, Computation and Display Technologies, and Monitoring Deep Space impacts on the Earth's atmosphere made this trip to the NOAA Boulder campus a day to remember. The tour was followed by a group dinner at the CU-Boulder Center for Community Flatirons Room and a spirited discussion of the day's program. Our thanks goes out to Valerie Schlecht who organized the event and the Denver Section ExCom members who assisted with the activities.

## A Day Without Electricity

Typing away on my desktop computer, suddenly my video screen went dark.

It was a fine Spring Saturday as I looked outside my second-floor window with nothing else seeming amiss. The birds kept chirping and the tree leaves were still blowing in the wind reminding me that Mother Nature needs no electricity to function. A sudden lack of any human invention goes completely unnoticed by the birds and the bees, flowers and trees.

At first, I was not alarmed because most big city power failures had been limited to an hour or two at most. I knew that crews would already be hard at work, repairing the most common faults shortly. Many of us have accumulated so many battery-powered devices that we can find alternatives for listening to radio broadcasts and getting around in the dark with the help of a flashlight. Unfortunately, I had not been using my laptop.

As I explored my house, I started noticing all the appliances that depend on electric power such as my land-line telephone that got its wireless features from a "Wall Wart" power supply. I scrounged my old touch-tone phone and soon heard a familiar dial-tone, powered by the standard 48 volts DC, provided by the local telephone company.

Perhaps, I thought, my loss of electricity was confined to my room or to my own house. Then a loud screech of brakes and a crash told me that a nearby traffic light had also gone dark, without warning. As darkness began to fall, there was no resumption of power. What could be causing the delay?

We are familiar with the usual causes of power failures:

- A drunk driver, driving at one hundred miles per hour, crashes into a power line pole. An inattentive squirrel walks along the high-voltage wires, into a large substation, ignoring the plainly-posted international symbol for "[No Squirrels.](#)" and accidentally shorts-out a large transformer.
- A tree grows upward, grounding an already-overloaded transmission line, tripping large segments of interlocking power grid causing a [huge national power outage.](#)
- An electrical storm damages a control system, in spite of lightning protection devices. An [EF5 tornado](#) sweeps across a city, "Hoovering-up" trucks, trains, hospital buildings and power plants with 250-mph winds in a mile-wide vacuum cleaner.
- A [massive ice-storm](#) weighs down so many power lines, that the wires snap and power line poles crash to the ground.
- Once in a generation, another cause of loss in a major power grid, is unexpected solar activity. Within the next year, our sun is now approaching its eleven-year peak of Solar Max. At any moment, with little advance warning, the Earth's magnetosphere might be subject to the pounding from an enormous cloud of charged particles, ejected at a million miles per hour, from a large solar flare.
- When the magnetosphere is pushed rapidly, large voltages are generated in the longest power transmission lines. In 1989, Quebec Hydro experienced a system-wide blackout, with burned-out large transformers, from a [solar storm](#), the strongest in 50 years.
- Early warnings of [solar activity](#) are now much more available from widely-placed monitoring satellites:
- More damaging than any solar storms, [Electro-Magnetic Pulse, EMP](#), has been considered as a potent weapon for future wars, for which no developed nation has any credible defense.

A classic example of the powerful effect on sensitive electronic equipment, was the unexpectedly powerful EMP that had been generated, when a thermonuclear weapon was detonated high above the ionosphere, near Hawaii, in a 1962 test called "[Starfish Prime.](#)"

In Hawaii, more than three hundred streetlights and microwave telephone links were knocked-out by the Electro-Magnetic Pulse. All of the burnt circuits had to be replaced, at considerable expense.

Many nearby satellites (including the famous Telstar) failed during 1962, from excessive charged particles, circulating along geomagnetic lines of force, within the unintentionally-created, temporary [artificial radiation belts.](#)

[continued on next page](#)

Since 1962, virtually all of our modern electronic devices use smaller, more delicate components (such as CMOS transistors and ICs), which are irreparably damaged by a similar EMP event. Military equipment is radiation-hardened, but commercial electronics are built more economically, and typically fail, whether from lightning bolts, Solar flares, or from an EMP event.

If you are curious about what life might be like, within the United States, after such an (all-too-possible) EMP attack, then you will enjoy reading a fascinating, recent novel entitled: [“One Second After” by William R. Forstchen](#), pilot of antique military aircraft, teacher of history and psychology.

The author recommends extensive preparations, similar to what was practiced by some “Survivalists,” in 1999, anticipating the expected confusion from Y2K.

However, an organized EMP attack (from a very few nuclear bombs, widely spaced across the continent, detonated well above the ionosphere, by enemies unknown, quite unidentifiable) would have a single disturbing effect, that electrical power might be knocked-out, indefinitely. Many side-effects that stem from a total lack of electricity, nationwide, would include: loss of all communication, petroleum fuels, transportation, food distribution, water, disabling of local emergency response teams (firefighting and police) and even loss of effective national government.

When my electricity had failed, I had found myself in an embarrassing predicament. If a Bricklayer is suddenly deprived of his bricks, then what is he? He might become a Brickmaker. If an Electrical Engineer is deprived of his electricity, then what is he? He would seek ways to create or generate electric power.

Before my power came back on, I had to continue this article, on lined paper, with the oldest, most-adaptable word-processor: a pencil, with a large eraser. Eventually, the lights came back on, across the city. I felt relieved, but remembered how unprepared, as we all have been.

Since then, I have been looking into ideas, like adding solar photovoltaic collectors to my roof, a small wind generator, storage batteries to my basement, a larger UPS, and even a bicycle-powered generator, so that I could ride-out a protracted, regional power failure.

In the future, growing and canning my own food, collecting rainwater, installing a fireplace, and super-insulating my walls, and similar measures might provide some peace-of-mind, to become completely “Off the Grid,” in the middle of a city.

Of course such massive changes would cost more time and money than most people have in their budgets.

Meanwhile, you might make a few minimal investments in: self-generating radio receivers and flashlights, rechargeable batteries (of every size), solar-powered battery-chargers, a few golf-cart batteries, UPS inverters (12VDC to 120VAC), extra blankets, and even solar cookers.

But don't open your refrigerator, until the power comes back on. And if your electric power doesn't return, within four hours, then eat the ice cream first.

- Richard C. Rew

## Denver IEEE Celebrates National Robotics Week



The Denver IEEE helped to celebrate National Robotics week at the local level with the Colorado Robotics Association in the **AUTOMATE! Denver Robotic Show** on April 14, 2012. Steven Gentner of **Roborealm** invited the Denver IEEE to present at the show, and IEEE Members Matt Taylor (RAS) and Jim Harrer (EMBS) setup a table to talk about IEEE membership and distribute literature.

Steve told me that the goal of the show was to:

1. have attendees leave with an increased awareness and excitement for robotics in Colorado
2. attract local government representatives to become familiar with the robotic industry in Colorado
3. provide a forum for companies to showcase their products.

This well-attended show, from 10am to 4pm on a Saturday, was tremendously successful in meeting these goals. Many different active robotics organizations were involved and demonstrated their products in a robot demo space where people could interact with and learn about the robots. The level of activity in Colorado robotics was an eye-opener to me - including robots in education (**FIRST, BEST and Ameribotics**), as well as amazing new companies and entrepreneurs present, like **Sphero, Road Narrows, Roborealm, Gamma Two Robotics**, and more. Please see some pictures below, and the list of links for more information.

During a couple breaks from the IEEE table, I made sure to tour the CRA Club Facilities, which include several lathes, CNC milling machines, routers, welders, embroidery machines, and more. These facilities are open to members and guests who sign-up for one of the many classes in machining and welding offered by the Club Workshop. This place is the dream-lab for a hobbyist or entrepreneur! Take some time to check this out for yourself one day soon.

We hope that many of these companies and organizations may also be interested exhibiting in the 2013 Region 5 Greentech Conference, to be hosted by IEEE Denver Section in April of next year.

- Jim Harrer, IEEE Sr Member

### Additional Links

[National Robotics Week](#)

[Colorado Robotics Association](#)

[RoboRealm](#)

[RoadNarrows](#)

[Rocky Mountain Best](#)

[Ameribotics](#)

[Club Workshop](#)

[Sphero](#)

[Gamma Two](#)



## GOLD (Graduates of the Last Decade)

GOLD is an affinity group in IEEE catering to the needs of the young professionals - specifically those within 10 years of their first degree. The Denver Section GOLD group focuses on a variety of events including:

- local lab/facility tours
- happy hour/networking events
- technical and non-technical talks

The Denver GOLD group also invites local student branch members to events as they will soon be the new face of GOLD. The GOLD group has recently been "reborn" in the Denver Section and we are looking to build momentum.

If you are within 10 years of your first degree and interested in volunteering a few hours a month to help us plan OR just interested in attending GOLD events as the IEEE point of contact, contact Jennifer Kramer at [jenniferkramer@ieee.org](mailto:jenniferkramer@ieee.org)

We would love to have officers from all around the Denver metro area including the tech center and south Denver, downtown Denver, and the north Denver/Boulder area. If you aren't GOLD and would like to help out the young professionals in the Denver Section, we could use your help! If your company can offer a tour, you have an area of interest for young professionals, or just want to get involved, please email Jennifer the appropriate contact information.

We are only as strong as our members and the help we receive! We look forward to a great 2012, and our most active year yet!

- Jennifer Kramer

## Denver Again Recognized as 'Outstanding Large Section'

For the third time in the last four years, the Denver Section has been recognized as the "Outstanding Large Section" in Region 5. The IEEE Region 5(R5) meeting was held in Tulsa, OK.. last April with attendees representing the 26 sections in Region 5. The Region 5 Director, Jim Jefferies (Past Denver Chair), presided over the meeting.. The Denver Section was also represented by Jim Look (Past Denver Chair R5 Western Area Chair), Rick Robinson (2010 Past Denver Chair), and Tim Weil (Past Washington, DC Chair, Denver Section Vice Chair). Accompanying the Denver contingent were Executive Committee (Excom) representatives of the 2013 Region 5/Greentech Conference (to be held in Denver). Excom members included Dr. Megan Paciaroni (Metro State), Dr. Eduard Muljadi (NREL) and Dr. Wenzhong Gao (University of Denver).

This year's Regional meeting was again co-located with the R5 Green Technology Conference and Student Professional Activities (SPACs) events which ran earlier in the week. As Conference Chair for next year's program, I was able to attend the Greentech Conference for the first time this year.

Along with Co-Chair Rick Robinson, and the ExCom attendees, we participated in the Greentech Technical Program and listened in to several Keynote presentations including –

**Bruce Phillips (ConocoPhillips) – Low-Carbon Hydrogen Production for Sustainable Energy Supply**

**Chuck Korstad (Applied Materials) – Cost Reduction Strategies for Solar Cell Fabrication**

**Dan Arther (All Consulting) – Hydro-Fracturing for Low Cost Natural Gas Production**

**Matt Feigner (Clean Energy) – A National Program for Natural Gas Vehicle Fueling and Supply**

**Don Van Pelt Smith (Omega Beef) – Supplying Low-Fat Beef from Renewable Resources (CO2 Recirculation and Algae-Based Feeds)**

## 'Outstanding Large Section' cont.

The representatives received a presentation on the awards program and were asked to submit names of deserving members for consideration of recognition for their support to IEEE. Throughout the day, there was the opportunity to watch Student Robotics competition in addition to the SPAC (Student Professional Awareness Conference) program. The evening banquet also included recognition of student competition teams and IEEE programs across the 26 R5 membership sections. The Denver Section award for 'Outstanding Large Section (Region 5) was based on the R5 Area Chairs evaluation based on the following criteria –

- Number of Meetings
- Type of Programs
- Strategic Plan
- PACE Activities
- Continuing Education
- Conference Activities
- Interactions with Chapters, Societies and Affiliates  
Special Projects

Region 5 has about 25,500 members of all levels and represents 7.5% percent of the IEEE membership. On the final day of meetings, an R5 Conference committee was held which discussed the current programs (SPAC, Green Technology Conference, and the R5 Regional meetings) as well as other programs across the Region. Significantly, the Denver Section has been awarded the R5 Annual Conference for 2013 and the organizing com-

mittee will manage this event (over 300 attendees with the SPAC and GreenTech programs). .

Region 5 members will be hearing more about new policy issues, regional strategic plans, and opportunities to volunteer for Region 5 positions supporting sections in our area. An overview of the conference is available at the Region 5 portal - <http://www.ewh.ieee.org/reg/5/> and through R5 Community Portal (login required) - <http://ieee-region5.oc.ieee.org/>. To learn more, contact the Region 5 Western Area Chair, Jim Look, at [jim.look@ieee.org](mailto:jim.look@ieee.org) or Tim Weil, Denver Section Vice-Chair at [vice-chair@ieee-denver.org](mailto:vice-chair@ieee-denver.org).

-Tim Weil



Denver Section receives award (Jim Jefferies, Tim Weil, Rick Robinson, Jim Look)

### IEEE Denver Section

#### Mission Statement

Enrich the professional and personal lives of the Rocky Mountain Region members, developing them into valued contributors to society through quality programs, continuing education, career development and community service; in collaboration with IEEE, industry, government and academia.



The IEEE Denver Section is comprised of over 3600 engineers and technical professionals in the Denver - Boulder area.

<http://www.ieee-denver.com/>