IEEE Region 4
Serving IEEE Members in all or parts of Illinois, Indiana, Iowa, Michigan, Minnesota Nebraska, North and South Dakota, Ohio, and Wisconsin

IEEE Region 4

2024 – Issue 02

Contents

Director's Column

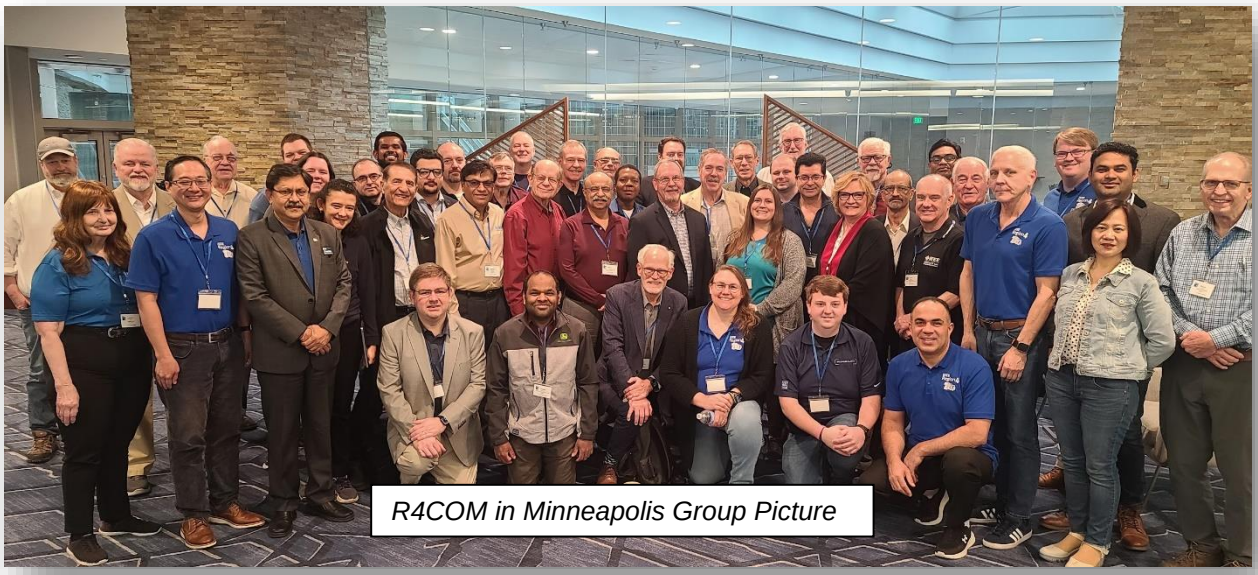
Region 4 Annual Meeting was held in Minneapolis April 26-28, 2024

The Region meeting was held at the Minneapolis Marriott City Center. We started the event with a social on Friday evening. Day 2 started with a welcome from the local Twin Cities Chair Ahmed Nauman, followed by two of the three "P"s: Tom Coughlin and Kathleen Kramer. Both shared their goals and ideas for the year and beyond. Followed by MGA VP Deepak Mathur who reviewed the role MGA plays and how they can support the Sections. IEEE USA President Keith Moore shared his 10 points on leadership and the focus of IEEE USA and events coming up in 2024.

- You are a leader
- Be credible
- Values and priorities are important.
- Focus on the future
- You can't do it alone, you need help.
- Trust and be trustworthy
- Challenges are opportunities to excel
- Lead by example
- Best leaders are learners
- Leadership is the core of an organization.

Keith was followed by the two Region 4 Director-Elect candidates Tarek Ladhiri and Sharan Kalwani. Director Vickie Ozburn summarized where Region 4 is and where we are going in the coming year. Our guests from Region 2 - Drew Lowrey and Region 6 - Kathy Hayashi, updated us on their Regions and activities. These presentations were followed by several committee reports and breakout sessions where Section representatives could talk with the Region Committee Chairs. The day was wrapped up with a "Ask Us Anything" session where all the IEEE leadership answered questions from the audience. This activity was a great success and some really good questions were raised. On Sunday we wrapped up the event with a group photo and Area meetings sharing challenges and best practices.

As always, thank you for all you do for IEEE!
Respectfully submitted,
Vickie Ozburn
Region 4 Director



R4COM in Minneapolis Group Picture

Editorial Corner

In this issue:

Presenting the 2024 Q2 edition!
We have yet another fantastic edition again, this time around. A ton of technical articles ranging from migrations tools for policy administration, AI for fraud detection, student capstone project brief, and all the way to computing with 'far" memory! Some of the other tech articles are on: AI regulation, supply chain & big data, etc. Of course, SKPL continues to make an impact in an ever growing number of communities in our Central Region aka the Midwest. Trip and conference reports always make for interesting reading, where one gets to learn of topics of discussion elsewhere. what goes on.

We have a newly listed job opening at the University of Indianapolis, do check it out.

Finally, a quick round up/updates of local member activities from all of our small, medium and larger sections area chairs helps complete this issue.

Previous editions in this series may be found on the Region 4 website. Click on the "Newsletter" button in the top left column. Comments and suggestions may be sent to the editor: sharan.kalwani@ieee.org

Microsoft Word format is preferred but we can work with ODT as well. Where possible use the Arial font in point size of 10. Images can be in either *JPEG, GIF, PNG or similar formats.*

We try to complete the newsletter layout a week before publication, to allow time for review and corrections. If you have an article or notice, please submit it as early as possible. We publish once every quarter.

The newsletter relies on the contributions of our members and officers, so please do not be shy. If you have something that should be shared with the rest of the region, we want to give you that opportunity. The next deadline will be end of August 2024 (about 2 weeks before the Labor Day break).

Sharan Kalwani,
Editor, Region 4 Newsletter and Enthusiastic IEEE volunteer
Chair, IEEE Southeastern Michigan Section (2021-2024)

SKPL Carlinville Story

Rural Library Opens a Window to the World of STEM With Science Kits for Public Libraries

For 15 years, Science Kits for Public Libraries (SKPL) has been providing grants to libraries in rural areas, small towns, and cities across the Midwest. These grants enable libraries to build circulating collections of science kits, which offer age-appropriate, hands-on materials for youngsters from kindergarten through middle school. These future engineers and scientists not only enjoy using the kits at the library — they're also able to check kits out and bring them home…just like a book.

A Hardworking Community

Carlinville is a town with a population of 5,700 located in southwestern Illinois, not far from St. Louis. About 23% of Carlinville residents live at or below the poverty line, including 50% of school-aged children. In her report on the local program, Carlinville librarian Hannah Miller points out that despite economic challenges, the town has a strong history of volunteerism.

Additionally, her report revealed 81% of Carlinville households have internet, including all families with public school children in grades K-12. Through this research, we determined that Carlinville was a community with a demonstrated need and reliable infrastructure where a SKPL grant could make a positive difference.

Preparing for Successful Circulation

Like all successful SKPL grant recipients, the library staff immediately got to work preparing the way for a circulating SKPL collection. They collaborated closely with teachers and visited local schools to introduce the program. They also educated patrons on SKPL, especially those who were new to the library.

Love of Science at All Ages

According to Miller, the Carlinville Library team chose kits that were great for all ages, and their deep understanding of their patrons paid off. Many families enjoyed the wildly popular Think Fun Gravity Maze, checking it out multiple times. Three science kits featuring snap circuits were also a big hit, with one family going through an entire booklet of ideas and creating all the projects at home.

"Kids go crazy for magnetic building blocks," Miller cheerfully shared, referring to the Magna-Tiles Building Kit. "Families often stop by the library to build with the tiles."

It's clear that wide-ranging enthusiasm for science is alive and well in Carlinville — as an official Bee City USA destination, the town has been recognized for its efforts to provide a friendly environment for these vital pollinators. That local connection made the Pollinator Kit a natural (and very popular) choice for Carlinville patrons.

A Bright Future for Carlinville
"The SKPL grant allowed us the amazing opportunity to enrich our offerings for kids and to purchase some really fun and interesting STEM kits," Miller shared when we asked what SKPL meant to Carlinville.

"We would never have been able to afford these kits without grant funds," she confided. "Rural kids from poor, small towns often miss out on 'extras' like these kits."

Her reflection reveals the long-term value of the SKPL program itself: "It's a wonderful feeling to be able to offer STEM kits to our community's kids and watch them gain interest and enthusiasm to learn even more. It's wonderful any time you can open the window to the world a little wider for our kids. We can't wait to see what they accomplish!"
The future is bright for Carlinville, too. "The kits have exceeded all expectations and remain very popular," Miller told us. "Just recently, I was able to find a good deal on a couple more kits (this time on coding and roller coaster engineering) to add to our collection soon. Thank you so much for starting STEM kits at our library! What a gift!"

You Can Help!
Donate **Contact us**
Written by Bill Kennedy, Evanston Illinois, SKPL Volunteer. Edited by, Amber Bostian, Attica Michigan, SKPL Volunteer.

SKPL 2024 Grants

SKPL 2024 Grants Announcement

Hello fellow SKPL'ers,
The IEEE Region 4 Science Kits for Public Libraries (SKPL) program brings hands-on STEM experiences to kids throughout the Midwest. The Region 4 SKPL Committee is proud to announce the SKPL Grant recipients for 2024.

The recipients are:

Library	State	Section
Sully Community Library	Iowa	Central Iowa
Withee Public Library	Wisconsin	Twin Cities
Belleville Public Library	Wisconsin	Madison
Dodge Center Public Library	Minnesota	SE Minnesota
Egerton Public Library	Minnesota	Twin Cities
Fox Lake District Library	Illinois	NW Chicago Sub-Section
Genoa Public Library	Nebraska	Nebraska
Glenwood City Public Library	Wisconsin	Twin Cities
LaCrosse County Library	Wisconsin	Coulee subsection
Mondovi Public Library	Wisconsin	S Minnesota
Rauchholz Memorial Library	Michigan	NE Michigan
Slinger Community Library	Wisconsin	Milwaukee
Sparta Free Library	Wisconsin	S Minnesota
Watertown Regional Library	South Dakota	Twin Cities
Watonwan County Library	Minnesota	Twin Cities
Wilmington Public Library District	Illinois	Chicago
Winter Public Library	Wisconsin	Twin Cities

Thanks to your efforts, these 17 public libraries will be enabled to loan science kits to the youth in their community. This was made possible by donors, in IEEE Region 4 and beyond, who made philanthropic contributions to support this program. It is estimated that over 25,000 youngsters borrowed a science kit in 2023.

WOW!
THANK YOU!

That's not all. In addition, S&C Electric Company and the Petroleum and Chemical Industry Committee (PCIC) of the Industry Applications Society (IAS) have each pledged to support 3 Grants each for libraries located in the Milwaukee, Chicago and Calumet Sections. That will bring the grand total up to a phenomenal 23 Grants.

Here's what North Manchester Public Library had to say about what the SKPL Grant program means to their library:

“The North Manchester Public Library is pleased to announce that it is a 2023 recipient of the Institute of Electrical and Electronics Engineers-Region 4’s Science Kits for Public Libraries grant. The $2000.00 grant has been awarded to the library for the purpose of creating a science kit collection for circulation to its patrons. The fund was established in Illinois in 2009 and has since spread to other states in the Midwest. The North Manchester Public Library is the fourth Indiana Public Library to receive the grant since its inception”.

“I’m thrilled that our application was successful," says Sarah Morbitzer, Children’s Department Manager. "The kits will be available to homeschoolers, daycare providers, Head Start, public school classrooms and individual patrons. Robotics, electrical circuitry, green energy, forensics, genetics, and physics will come alive with hands-on experimentation in the home, at the library, or in the classroom! We’ve already received the first installment of funds and ordered our first batch of kits. We’ll need some time to get them cataloged and ready for circulation, but we plan to have them ready for checkout by the end of the summer."

"One of the benefits of this grant is that financial barriers will not be an issue for STEM learning and experimentation,” says Diane Randall, Director. “Thanks to IEEE-Region 4, we can offer free access to the community through library checkouts. Library led programs will open doors to learning for those who are initially hesitant to test the kits on their own or who simply enjoy learning in a group setting."

“The grant will be used to purchase nearly 30 different science kits for grades ranging from kindergarten through high school. Several of the kits purchased will be classroom packs for group instruction.”

"We are proud of our tight-knit community, but also intensely aware of the fact that many of our patrons lack easy access to science museums, zoos, etc. These extras provide many advantages to residents of big cities,” says Jeanna Hann, Adult Department Manager & Marketing Coordinator. “As a community center, we seek to close those gaps by providing as many opportunities as possible for hands-on learning at the library. This grant will enable us to freely give young library users access to scientific experimentation and learning, an area we are currently lacking in here at NMPL."

"The Science Kits for Public Libraries grant will bring resources for hands-on learning and exploration to library users,” adds Molly Magnus, Programming Coordinator. “While we have many science books and DVDs available for checkout, they are no substitute (especially with children) for those hands-on experiences. Touch, sight, sounds – learning with the senses is memorable and will make STEM ‘stick’ with the kids."

“SKPL’s belief is that children should have access to quality, hands-on STEM learning experiences, and in particular, all children, regardless of race, gender, financial condition, or home environment is in direct alignment with the library’s goal to offer social, educational, and cultural enrichment opportunities. Our goal is to offer residents, regardless of physical ability, or socio-economic status, with services and programs which boost educational opportunities and provide access to services we do not have elsewhere.”

“Starting a special collection like this has been a goal of ours for some time and it will help create greater access to these kinds of materials and to expand upon the concept of libraries being more than just books. With this grant money, we can proceed with this project and the kits we’re proposing will cover several areas of STEM subjects including biology, circuitry, math, coding, and more.”

“This grant will fund the North Manchester Public Library's first circulating science kit collection! The SKPL grant will bring many resources for hands-on learning and exploration to library users. While we have many excellent science books and DVDs available for checkout, they are no substitute (especially with juvenile learners) for physical interaction and manipulation of various materials. The SKPL Grant will take the learning we are able to offer from the theoretical to the practical. Touch, sight, sound, and learning with the senses is memorable and will foster a deep and abiding interest in

STEM. These new Science Kits would allow us to expand our offerings to include grade school-age children, and adding a specific STEAM-themed component will fill a very particular gap in our collection. While the development of programming is important, the library's mission clearly indicates that our goal is to transform our patrons into lifelong learners. These Science Kits would be an important part of making that happen."

You matter, my fellow SKPL'er. Your work matters. The depth of your caring matters. You're making a difference in the world and it matters! Keep up the good work.
Thanks for all you do.

John A Zulaski
Region 4 SKPL Committee Chair
Zulaskija@gmail.com
847-209-8672

SKPL Call for Volunteers

Call for SKPL Volunteers

The Science Kits for Public Libraries program needs your help. This year, we are on track to award $30,500 in grants to 17 libraries. Next year, our goal is to award $50,000 to 25 libraries. To accomplish this goal, we need additional volunteers. If you are interested in joining the SKPL team, please contact Bill Wilkens (wdwilkens@ieee.org) or John Zulaski (zulaskija@gmail.com) for more information.

You Can Help!
DONATE **Get Involved** **Learn** **Contact us**
Written by Bill Kennedy, Evanston Illinois, SKPL Volunteer. Edited by, Amber Bostian, Attica Michigan, SKPL Volunteer.

SKPL Science Kits for Public Libraries

IEEE Foundation Donor Supported Program

IEEE Region 4

Life Members Report

Life Member Conference Report
May 1, 2024
Michael Andrews

The 2024 IEEE Life Members Conference served as a platform for fostering collaboration, innovation, and knowledge exchange. Sponsoring entities demonstrated support for an experience that IEEE members, of all membership grades, will talk about for years ahead. It also provided an excellent opportunity for the conference attendees to develop a deeper understanding of the sponsoring organization's products and services.

> *"IEEE Life Members are an underutilized resource in the IEEE. The Life Members Conference showed how Life Members can continue to Contribute to IEEE's mission and stay engaged with the latest technical developments."*
>
> *Tom Coughlin, President, IEEE*

The conference had over 40 invited speakers. Their contribution of time and talent was critical to the success of the inaugural IEEE Life Members Conference. Their insights, expertise, and presentations made a significant impact on the 179 conference attendees.

The speakers provided current information on a variety of technical and leadership issues. Linked to the conference theme, **Evolution**, the conference offered a combination of workshops, panels, keynote presentations, and breakout sessions:

1. **Technology** – explore selected emerging technologies that impact seniors.
   + Technologies of the Future and the Next Chapter
   + Aging Society and Technology Progress
   + Renewable Energy and Sustainability
2. **Applications** – discuss applications of technology for aging populations
   + Financial and Investment Strategies
   + Smart Systems, Infrastructure, Equipment and Living
3. **Contributions** – sharing resources with future leaders
   + Mentors and Influencers in the Modern Society
   + Professional Development, Sharing and STEM Education

Some of the notable speakers included: **Tom Coughlin, 2024 IEEE President** and Coughlin Associates**; Tim Lee, 2024 IEEE-USA President-elect** and the Boeing Corporation**; Dr. Vincent (WooPoung) Kim,** Samsung**; Rodney Brooks,** iRobot**, Michael Branch**, Geotab**; Karen Panetta,** Tufts University**; Fred Schindler,** VP – IEEE Technical Activities Board and RF Engineering Management**; Thom Singer,** Austin Technology Council**; Brittne Kakulla,** AARP Technology**; Julie Shah,** MIT Interactive Robotics**; Greg Corrado,** Google Research**; Kendra Cook,** NASA/JPL**; Paul Hopingardner,** Travis County**; Manuela Veloso**, J.P. Morgan AI Research**; Ben Sander,** AMD**; John McDonald,** JDM Associates**; Barbara Grosz,** Harvard**; Michael Andrews, IEEE Life Member Conference Chairman** and Andrews & Associates.

Conference attendees represented all ten IEEE regions. In fact, we hosted an "early bird registration" prize. The three winners were from Australia, California, and Switzerland.

The speakers paid their own expenses to travel to Austin. That level of commitment, their willingness to share insights and experiences played a pivotal role in making the conference a resounding success. Presentations provided valuable information. Speakers inspired and motivated our attendees, encouraging them to explore innovative ideas and advance their understanding of the latest developments in various IEEE fields of interest.

Sponsored displays were easy for the attendees to find, and the location of the displays were in the heart of the conference area. Based on observations, the traffic with the sponsoring organizations kept representatives busy throughout the conference.

The conference was launched following two studies, each with a sample size of 5,000 Life Members residing in North America. The findings and feedback we received from respondents ultimately drove the acceptance of the Life Members Committee to host an event primarily for Life Members. Topics and speakers represented a diversity and level that would attract IEEE members of all grades.

The vision for the conference was predicated on five foundational ideas:

1. **Learning never stops**: Listen to others with an open mind, read books, take classes to remain technically current, and always explore new ideas.
2. **Make a difference**: Mentor students, support humanitarian initiatives, or contribute to the IEEE Life Member Fund.
3. **Actively participate**: Attend and influence IEEE events.
4. **Contribute time and ideas**: Be seen by IEEE as contributors as well as resources of knowledge and expertise.
5. **Provide guidance**: Clarify technology matters and assist policy makers in translating and implementing technology laden legislation.

The conference theme was **Evolution**. The conference addressed the evolution of technology, the evolution of careers and contributions of attendees, and the evolution of what the attendees will accomplish in the future.

The support of the sponsors not only benefited the 179 conference attendees but also underscored the dedication of sponsors to support initiatives that promote professional development, lifelong learning, and the advancement of engineering and technology.

We are in the beginning phases of developing **Evolution 2** – the 2025 conference. The event is planned for Tufts University in late May/early June.

Based on attendee feedback, I believe they will share their experience with their network and “create a buzz” about what sponsors and speakers contributed to the conference.

> *“The Conference Organizing Committee did a remarkable job. They identified the key areas of interest provided by our members and recruited speakers who shared their insights and experiences, playing a pivotal role in making the conference a resounding success. Importantly, the conference provided Life Members and attendees representing all IEEE member grades to expand their skills and value to other members, mentees, and to the industry.”*
>
> *Michael Andrews,*
> *IEEE Life Members Conference Chair*

IWRC @ South Dakota

IEEE-USA IWRC brings the CHIPS Act to South Dakota 11 June with key sponsor Air Force Research Network-Midwest!

The 2024 IEEE-USA IWRC (Innovation, Workforce, and Research) Conference brings together industry leaders, academics, and government representatives to bridge the gap between cutting-edge research and practical, market-ready applications. During this one-day summit, experts from the Dakotas and across the country will delve into topics such as research grants, technology transfer programs, start-up funding, and intellectual property. The 11 June event aims to inspire and empower true innovation in the Dakotas and Midwest. Don't miss the pre-conference evening reception held the night before – tickets are available now at https://iwrc.ieeeusa.org/dakotas/.

Leah Laird
Sr Marketing & Communications Specialist
IEEE-USA | 2001 L Street NW, Suite 700, Washington, DC 20036-5104

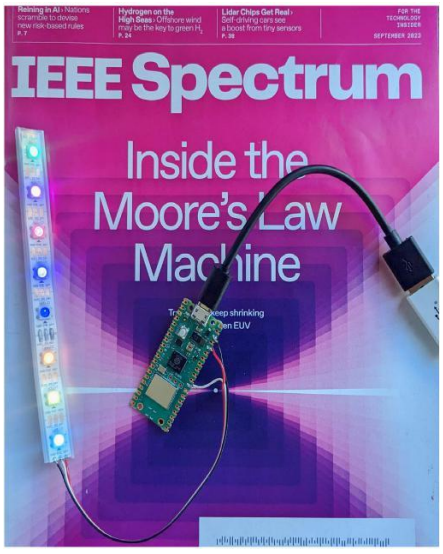
Raspberry Pi Workshop

Raspberry Pi Pico Workshop for Students
The Madison Section held two 90-minute workshops for students at the University of Wisconsin, Madison with the intent on getting students to join IEEE. Students brought their own laptops and were loaned Raspberry Pi Picos with a USB cable and a string of color changing LEDs. The lecture covered using the Pico as a "drag and drop" programmed system and covered installation and use of the Thonny Micro Python and the Pico Development add-in for the Arduino IDE. Students who joined or were members of IEEE got to take the Pico home.

Over 60 students attended the workshops and every student had at least on successful software development toolset installed and used. Students took 25 devices home and that was just about the number of new IEEE Student members we seemed to have recruited. For the first time in recent history, there are now more Undergraduate Student Members than Graduate Student Members with the Madison Section.

A shortened version of the Workshop, on-line only is available for viewing on IEEE.tv here:
https://ieeetv.ieee.org/video/raspberry-pi-pico-hardware-and-software-overview

For detailed Workshop Material, see the links in the Workshop Event listing here:
https://events.vtools.ieee.org/m/381108



My Life in IEEE

What IEEE Meant to me for over 50 Years
By Tom Kaminski

At the recent R4com in Minneapolis, a panel was asked to explain to potential new members what the value of IEEE was to them. Over the years, as I grew professionally and changed my technical emphasis, IEEE has been a help.

I joined as an undergraduate engineer at Worcester Polytechnic Institute around 1968 and at that time was interested in circuits. Unfortunately, when I graduated in 1971, the United States was awash in unemployed engineers since the NASA Space Program had successfully landed men on the moon and was now shedding jobs. I went directly to the University of Michigan for one year to earn an MSEE and was exposed to computers through a LINC-8 minicomputer used to support an adaptive CODEC for voice encoding. I joined both the Signal Processing and Computer groups at IEEE based on my studies there.

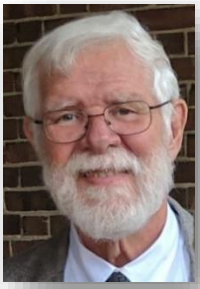
My first full-time job was as an engineer working for the Lab for High Energy Astrophysics at NASA/Goddard Space Flight Center. I had to learn about nuclear radiation detectors since I was helping to develop x-ray and cosmic particle detectors as well as the ground support equipment for testing the systems. I was also exposed to early microprocessors (Intel 4004, 8008, Zilog Z80, Intel 3000 series bit slice components) so I continued with the Computer Society and also joined the Nuclear Society. IEEE publications helped in my new career growth.

I decided to go back to pursue a PhD in Computer Engineering at the University of Wisconsin where I studied Fault Tolerant Computing, Controls and Computer Architecture. I joined additional IEEE societies and also attended IEEE sponsored conferences to help with my professional growth. I never finished my PhD because my advisor, Jim Smith, and I started a company developing a mini-supercomputer. My professional life took another turn, and IEEE USA offered some Professional Development courses that I took to learn more about business, Also, my wife and I had our first of three children and IEEE had a very low-cost term-life insurance program I utilized.

After the start-up failed, I consulted and started a new company to develop an innovative heat pump – through far afield from Electrical Engineering, I used IEEE professional contacts to help grow and promote the business. Finally, I gave up on the business and began teaching at the local Madison Area Technical College where I taught Electronics, Automation, Sensors, and Robotics to Industrial Maintenance Mechanics. I joined the Robotics Society, the Industry Applications Society, and the Power Electronics Society to help with my continued professional growth in yet another area.

My answer to the question is: “As a professional, your career is bound to take a path with frequent changes. Join IEEE for the thrill of life-long learning, and to build professional and social contacts. At each stage in your professional growth, IEEE is there to help.”

It was for me!



Thomas Kaminski

AI Regulation

The Requirement for AI Regulation: Safeguarding Society's Future
By Zach Wilson

The rapid expansion of artificial intelligence (AI) technologies has sparked a global debate regarding the necessity for enacting regulations regarding AI. While AI promises benefits across various industries, its current unchecked development and deployment raise significant concerns that require immediate action. This article covers the importance of AI regulation, while highlighting recent sources and developments to shine light on the urgency of establishing frameworks to mitigate risks and ensure responsible use of AI.

Mitigating Bias and Discrimination:
One of the biggest concerns with AI is its potential to perpetuate and amplify existing biases, leading to discriminatory outcomes in critical areas like employment, lending, criminal justice, and more. The issue stems from AI systems being trained on data that often reflects these biases. For instance, facial recognition technologies have been shown to exhibit racial and gender biases, leading to misidentification and potential harm.

The Council of State Governments' (CSG) 2023 report, "Artificial Intelligence in the States: Emerging Legislation," reveals that several states have enacted laws aimed at transparency and accountability in AI systems to address this issue. These legislative efforts mandate impact assessments, disclosure requirements, and auditing mechanisms to ensure that AI algorithms are fair, unbiased, and do not perpetuate existing inequalities (CSG, 2023).

Addressing Economic Disruption and Job Displacement:
The potential of AI becoming automatic poses significant challenges to the workforce, with the potential for widespread job displacement and economic disruption. While AI has the potential to create new jobs and industries, the transition period can be fraught with challenges for workers whose skills are no longer in demand.

The Brookings Institution's 2024 analysis emphasizes the importance of proactive policy measures to mitigate these risks, including investments in education and workforce training, as well as social safety nets to support those affected by AI-driven job losses (West & Allen, 2024). The report highlights the need for an approach that includes multiple perspectives and that considers not only the economic impact but also the social and emotional consequences of job displacement.

Ensuring National Security and Preventing Weaponization:
The potential that AI can be weaponized is concerning, particularly in the form of autonomous weapons systems, raises alarming ethical and security concerns. The development of lethal autonomous weapons systems (LAWS) has sparked international debates about the ethical implications of delegating life-and-death decisions to machines.

The U.S. Department of Defense's 2023 report on AI ethics principles underscores the need for clear guidelines and international cooperation to prevent the misuse of AI in warfare (DoD, 2023). Additionally, President Biden's 2023 Executive Order on outbound investment restrictions highlights the U.S. government's recognition of AI as a sensitive technology with potential national security implications (Morgan Lewis, 2024).

Protecting Privacy and Personal Data:
As AI systems rely on extremely large amounts of data to function, safeguarding privacy and personal information is a must. AI-powered surveillance systems, personalized advertising, and data-driven decision-making raise concerns about the potential possibility of misuse of personal information, surveillance, and manipulation.

The European Union's General Data Protection Regulation (GDPR), while not specifically targeting AI, has established a robust framework for data protection that can serve as a model for AI regulation (Perkins Coie, 2024). Additionally, states like California have enacted privacy laws with specific provisions for AI, demonstrating a growing legislative focus on data protection in the AI context (CSG, 2023).

Fostering Transparency and Accountability:
The amount of transparency surrounding AI algorithms raises concerns about transparency and accountability in decision-making processes. When AI systems make decisions that affect individuals' lives, it is crucial that those decisions are explainable and justifiable.

The growing demand for explainable AI (XAI) reflects the need for AI systems to provide clear explanations with their decisions, ensuring that individuals understand how and why decisions are made. The National Institute of Standards and Technology (NIST) is actively developing an AI Risk Management Framework that emphasizes transparency and accountability as key principles (NIST, 2023).

The urgent need for AI regulation is highlighted by the potential risks and challenges associated with its unchecked development and deployment. Recent developments in legislation, executive orders, and international initiatives shine light on the growing consensus that regulatory frameworks are essential to mitigate bias, protect privacy, ensure economic stability, prevent weaponization, and foster transparency and accountability. As AI continues to evolve, policymakers must act responsibly to establish comprehensive regulations that safeguard humanity's future while harnessing the transformative potential of this powerful technology.

Sources:

- Council of State Governments (CSG). (2023). Artificial Intelligence in the States: Emerging Legislation. https://www.csg.org/2023/12/06/artificial-intelligence-in-the-states-emerging-legislation/
- West, D. M., & Allen, J. R. (2024). How artificial intelligence is transforming the world. Brookings Institution. https://www.brookings.edu/research/how-artificial-intelligence-is-transforming-the-world/
- U.S. Department of Defense (DoD). (2023). Department of Defense Artificial Intelligence Strategy. https://www.ai.mil/docs/DAAIS_Slick%20Sheet_FINAL.pdf
- Perkins Coie. (2024). States Begin To Regulate AI in Absence of Federal Legislation. https://www.perkinscoie.com/en/news-insights/states-begin-to-regulate-ai-in-absence-of-federal-legislation.html
- Morgan Lewis. (2024). Existing and Proposed Federal AI Regulation in the United States. https://www.morganlewis.com/pubs/2024/04/existing-and-proposed-federal-ai-regulation-in-the-united-states
- National Institute of Standards and Technology (NIST). (2023). NIST AI Risk Management Framework. https://www.nist.gov/itl/ai-risk-management-framework

About the Author:

Zach Wilson is a full time Application Developer who is currently pursuing an MS in Information and Communication Sciences and an MBA at Ball State University (expected completion in 2025). He has a Bachelor's in Computer Science and Political Science from Indiana University–Purdue University, Indianapolis (2023). He also contributes as an Adjunct Faculty member at the School of Information Technology at Ivy Tech Muncie campus, where I share my knowledge by teaching courses like Computing Logic and Advanced Simulation/Game Design. He can be found at (https://www.linkedin.com/in/zawils/)

GatesAir Tour Report

GatesAir Plant Tour and presentation on "General Overview of the Various Worldwide Digital Formats for Terrestrial Broadcast Transmissions"

Meeting report by Don O'Brien

On May 20th GatesAir hosted a meeting for the IEEE Region 4 Central Illinois Section that comprised a tour of the GatesAir Manufacturing facilities and a presentation of the various over the air digital formats that GatesAir transmitters support. They also support analog transmission for radio as well. GatesAir ships transmitters world-wide from Quincy, Illinois.

During the plant tour we observed where raw materials arrived at the south most part of the plant and were cleaned and prepared for machining and milling. GatesAir produces most of the parts for the transmitters in the plant. The general flow in the plant is south to north. At the north end of the plant the finished and packaged transmitters await transport to customer destinations. They have standard order products that are ready to ship upon customer demand, however GateAir customizes many of the transmitters it manufactures to meet customer specific requirements. There is a specific section in the manufacturing plant devoted to implementing custom transmitter requirements.

We returned to GatesAir training center, where GateAir engineer and IEEE member Steven Kacmarynski gave a presentation on various digital formats that can be supported on the transmitters. The technical standards vary by region of the world, such as the IBOC HD radio standard in the United States and the DAB standard used in Europe. I found the Digital Radio Mondiale support for Low Frequency to High Frequency bands as DRM30 standard very interesting, and it is an open source standard too. DRM30 is popular in India and Pakistan. Some of the new digital television broadcast standards such ATSC 3.0 offer some very advanced capabilities with the injection of internet protocol capabilities to the broadcast.

Quincy, Illinois is the western most city in the Central Illinois Section and it was great to meet the local IEEE members, many who have worked at GatesAir in the past. It was also great to have some IEEE members join the presentation session on-line. We hope to have another meeting soon to explore more of the exciting changes in digital terrestrial broadcasting.

Names of individuals Right to Left: Dr. Anu Gokhale (Senior Member), Marvin Kerber (Life Member),Gene Zimmerman (Member), David Edwards (Life Member), Brad Hampton (Guest), Don O'Brien (Member), Bruce Whiteside (Life Senior Member), Steven Kacmarynski (Member)

Supply Chain & Big Data

Supply Chain Management and Big Data Analytics
By Ketan Rathor

The use of big data analytics, also known as BDA, is becoming more essential in the domain of supply chain management (SCM), which is acquiring substantial significance overall. This comprehensive literature review has three primary objectives: to classify the different uses of predictive big data analytics (BDA) in supply chain demand forecasting, to identify specific areas that need further investigation, and to propose potential directions for future research. In the current economic climate, many firms have used several marketing techniques to sustain or enhance their profit margins and gain a competitive edge.

At the level of enterprise resource planning (ERP) and warehouse management system (WMS), important data related to items and orders, monitoring of goods, and invoicing of goods is carefully maintained. We now have all essential elements of information in our hands. To enhance the efficiency of information generation, a diverse array of technologies is used. The technologies mentioned include barcodes, enterprise resource planning (ERP) systems, sensors, and database software.

The main aim of this meta-analysis and literature review is to investigate and assess the current research on "demand forecasting" in supply chains, which has become a crucial and widely researched topic in recent times. The process of predicting future demand for a particular product or service is frequently referred to as "demand forecasting". Due to the unique characteristics of demand data in modern, expanding global supply chains, the process of predicting demand requires the use of big data analytics techniques in conjunction with machine learning methods.

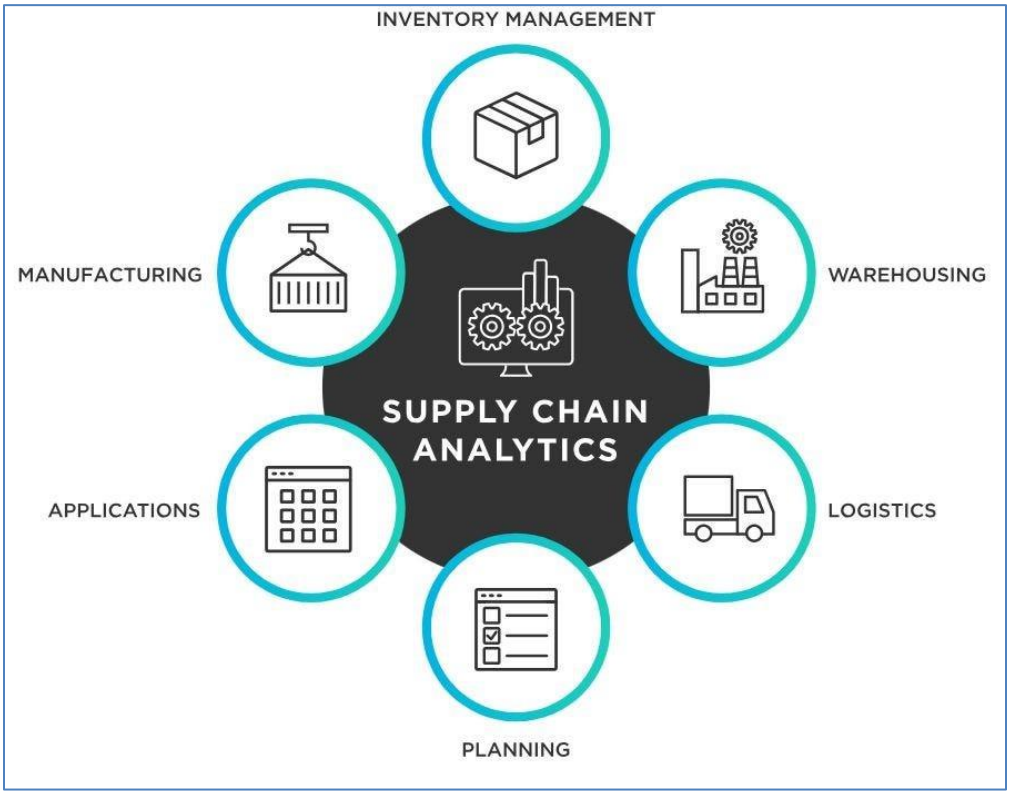


Fig 1: Big data analytics in Supply chain management

The growing significance of big data analytics is bolstered by many causes, including the integration of Blockchain technology to enhance supply chain monitoring. In addition, the process of converting supply chains into digital formats is also playing a role in this pattern). Concurrently, the presence of these two factors contributes to the continuous process of digitizing supply chains, thereby strengthening the increasing significance of big data analytics. The manufacture of this item occurs in several settings throughout the whole supply chain to meet different objectives, such as supplier capacity, items, customers, merchants, and other pertinent criteria.

The Internet of Things (IoT) is a network that connects various physical devices, automobiles, appliances, and other items. These objects are equipped with sensors, software, and network connection, allowing them to gather and share data. The ongoing development of data, which includes the large amounts generated by Supply Chain Management (SCM), is mainly due to the almost infinite variety of forms and sources from which this information comes. The existence of many information forms is the fundamental reason for these phenomena.

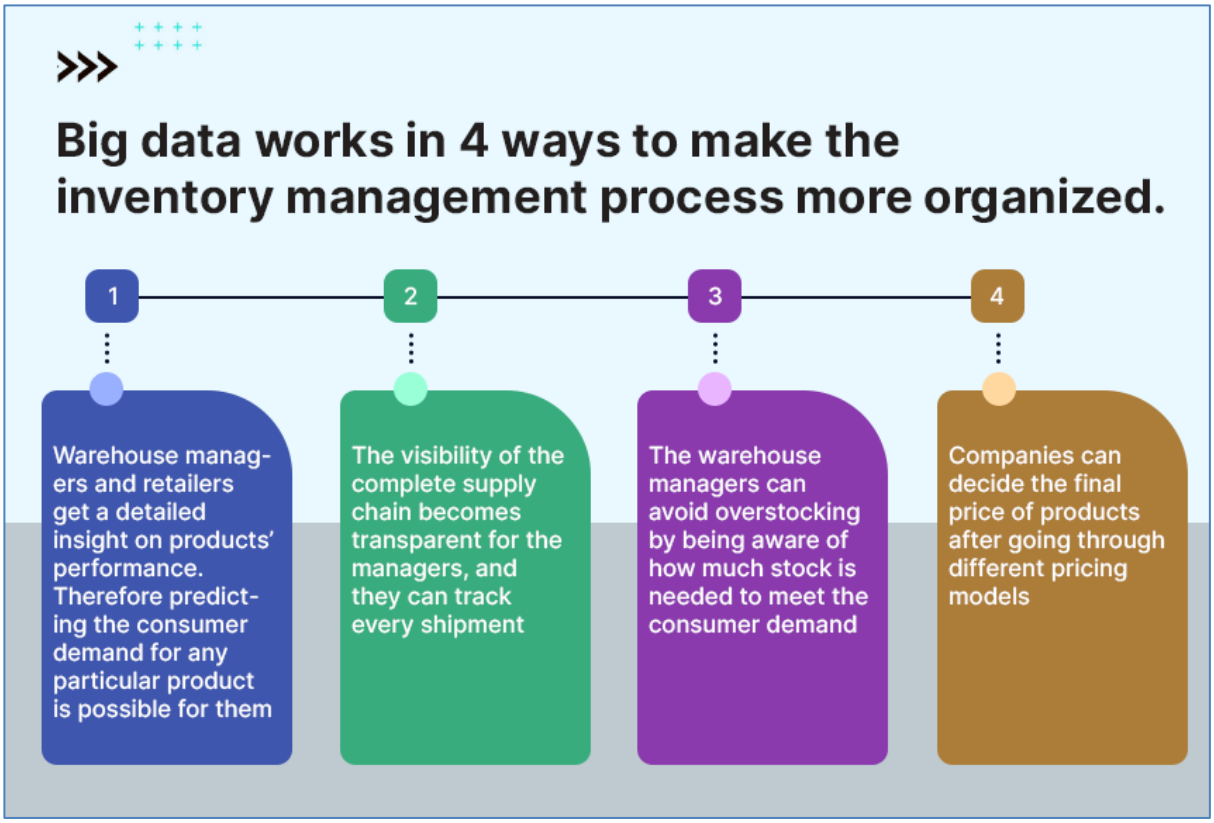


Fig 2: Big data on inventory management

These sensors are given the critical role of collecting and transmitting data to a central location for further analysis. This task is under their jurisdiction. The term "value" is linked to the essential information that guides decision-making. The existence of several sources of information is the fundamental reason behind these phenomena. Based on this line of thinking, it is essential to ensure that the data accessible for real-world application is as dependable as possible. Due to the wide variety of sources and formats from which the data is obtained, it is crucial that these operations are performed in the specified sequence.

Spreadsheet models used for demand forecasting are limited by their inability to handle very huge amounts of data. The use of spreadsheet models is linked to a notable downside, which may be regarded as the main constraint. Traditional statistical methods, such as moving averages or exponential smoothing, are not enough for successfully extracting, evaluating, and resolving the complexity and uncertainties related to Supply Chain Management (SCM). The existing application of Supply Chain Management (SCM) is impeding the viability of this job.

For the purpose of improving the precision of demand management predictions in the realm of supply chain management, the use of big data analytics is an extremely important factor to include. Professionals working in supply chains are able to successfully foresee changes in demand and coordinate operations related to production, stock management, and distribution because to the higher degree of precision that is supplied by this skill.

This assertion is supported by a substantial majority of these models, which is something that should be taken into consideration. As an alternative to doing an analysis of the present economic environment, which entails studying the swings in value that the industry is now experiencing, this strategy makes use of previous data in order to develop forecasts. As a replacement for carrying out an exhaustive investigation of the present status of the economy, the strategy that was just described is put into action.

The incorporation of these components into the unfamiliar setting has the potential to make the process of acclimatization easier to accomplish. Increasing the possibility of producing accurate predictions is something that might be accomplished via the use of this specific strategy. The employment of predictive algorithms makes it easier to generate prescriptive answers to future occurrences. This is accomplished by the incorporation of optimization, simulation, or a mix of the two approaches. In a broad variety of settings, the advantages of these processes have been found to be beneficial.

About The Author:

Ketan Rathor has 21 years of IT Leadership experience in Project Management, Solution Architect, Digital Transformation, Analytics, Sales and Supply Chain. Ketan is an accomplished global technology industry leader with unique experience of working globally in his career from 15 countries in the world. Ketan is certified in SAP Activate Project Management, PMI-ACP, S4 HANA Sales. Ketan has bachelor's in chemical engineering, Certificate in Leadership and Change Management from IIM and a Certificate in Ethics in Artificial Intelligence. He is a Senior member of IEEE, Fellow of BCS, Fellow of IET and is currently serving as Senior Project Manager in GyanSys Inc.

Region 4 Awards: Nominations Are Now Open

Dear Colleague,

Each year, IEEE Region 4 recognizes excellence among the leading contributors to the profession. To make sure that no worthy candidate goes undiscovered in our effort to recognize deserving individuals, **we need your help!**

You may know a mentor, colleague, or friend who has accomplished something impressive and noteworthy, but is too humble to seek recognition. In many cases, very deserving individuals are underrecognized for their achievements.

I am asking you to nominate a fellow professional who you believe is deserving of a Region 4 Award. Please circulate the awards information to your community members to assist us in reaching a broad and diverse pool of worldwide professionals. Recognizing innovative technical leadership is among the most impactful contributions we can make to the profession.

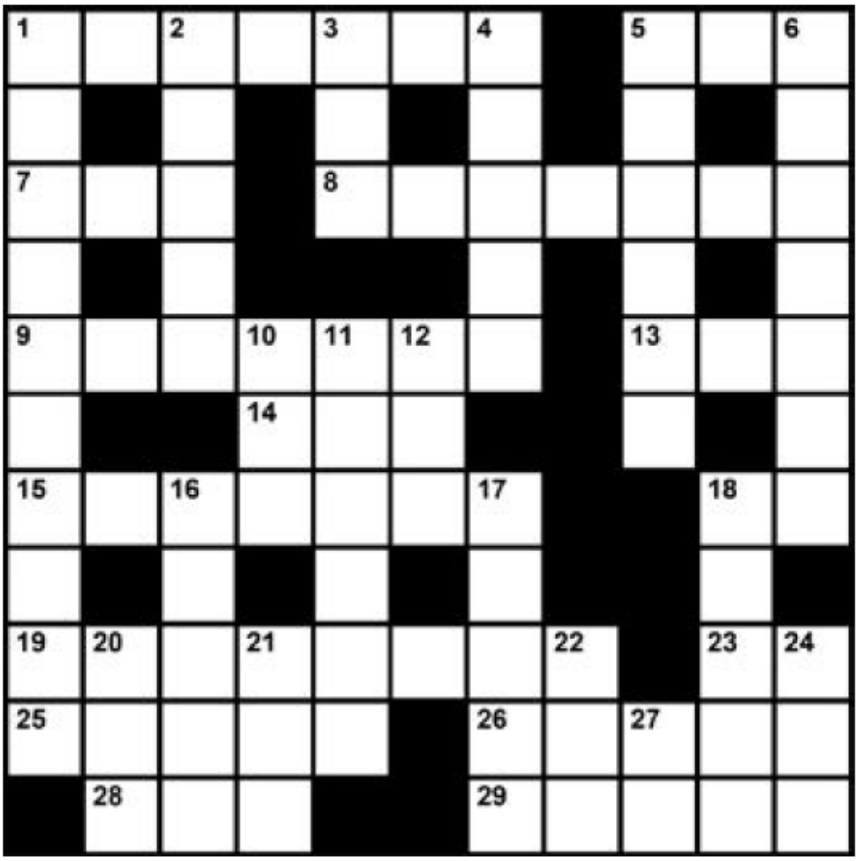
Start the nomination process today by visiting: https://r4.ieee.org/committees/awards/

Thank you.

Steve Kerchberger
Chair, Region 4 Awards and Recognition Committee

(NEW) Crossword Puzzle

Source: IEEE-USA E-Books, Engineering Crossword for Students by Myles Mellor, 2018



Answers can be found somewhere in this newsletter!

ACROSS

1 Where a current can flow
5 Road surface material
7 Automated computer program
8 Sideways
9 Bring back to the original condition
13 Evaluating quality
14 Not operational
15 Made a paper copy
18 Top grades
19 Branch of math 23 Tech department
25 Apply, as force
26 East coast state
28 Not an exact figure, for short
29 Cold metal shaper

DOWN

1 The whole global computer network
2 Puts a grade on
3 Web page address
4 Car owner's document
5 Kind of printing where you can create objects—2 words
6 Revolving cylinders
10 Vehicle weight measure
11 Product
12 Route, for short
16 Runs in neutral, as an engine
17 Large containers for liquid
18 Breezing through, as an exam
20 Lumberjack's tool
21 Cathode-ray tube, for short
22 Observed
24 Shirt type
27 Des Moines' state

EMC Scholarships

The Chicago Chapter of the IEEE EMC Society is offering college scholarships to Electrical Engineering students, who reside in the greater 6-county metropolitan Chicago area. For details on eligibility and how to apply go to: https://www.emcchicago.org/emcs1.pdf. *Submit deadline: June 15*

Charting the Unseen

Charting the Unseen: Machine Learning in Zero Carbon Strategy Formulation
By Vishwanadham Mandala – IEEE Senior Member

Zero Carbon Strategy Formulation
Governments, businesses, and institutions globally are prioritizing a zero-carbon future. Over 100 countries have adopted or proposed 2050 zero-carbon targets. Notably, the UK government has set a significant benchmark by committing to net-zero emissions by 2050. This underscores the urgency of the issue and serves as a model for other nations. Industry bodies like the British Green Building Council have outlined steps to achieve zero-carbon buildings by 2050. However, there is limited guidance on building the pathway to carbon neutrality. Current documents focus on sector-specific policies and actions needed for the low-carbon transformation, but a more dynamic evaluation or analysis of collective benefits is required. There needs to be a forward-looking strategy or coordinated plan, making long-term targets and interim milestones often reactive and fragmented.

A Zero Carbon World

The Role of Machine Learning in Sustainability Efforts
Machine learning algorithms are uniquely suited to the infamously complex, multidimensional, and entangled problems characteristic of sustainability. They contain solutions that are neither human nor easily understood. Their power to uncover and exploit patterns in data is catnip to optimization analysts. Algorithms clever at learning can evaluate a vast space of possible model architectures, exploring each in turn, selecting hyperparameters from a range of options, fine-tuning chosen parameters, and then modeling their way through the data. Machine learning models do not rely on expert knowledge to generate insight, although the judicious application of such knowledge can help deliver more robust predictions. In short, machine learning algorithms are very good at throwing themselves at the wall of a complex problem and waiting to see what sticks. This underscores the potential of machine learning in addressing sustainability challenges and justifies its use in sustainability efforts.

It's crucial to note that machine learning is neutral as a technology. It doesn't have a 'desire' to solve a problem; it's oblivious to it. Any human operator provides the framework within which problems are defined, solutions are considered, and success is evaluated. We can just as easily use machine learning models to increase the energy intensity of a critical industrial base as we can to eliminate it. A less desirable outcome of this fact is that we can use machine learning to discreetly amplify wealth and power in the hands of a few, regardless of the social or environmental consequences. Before we can harness machine learning for the greater good, we must invest time in understanding sustainability

problems and defining our approach to solving them. The hope is that machine learning technologies will be as transformative and revolutionary, capable of generating as much social and environmental wealth as financial wealth.

Machine Learning Applications in Zero Carbon Initiatives
We have identified 40 case studies involving machine learning and zero carbon. These include training, deep learning, cumulative algorithms, feature selection, pattern matching, optimization, forecasting, and other applications. The case studies show little use of machine learning in long-term strategic initiatives. Table 4 summarizes the applications in corporate, investment, and policy strategies. The high-level goals of strategies in decision-making are outlined.

Challenges and Opportunities
We assessed the current use of machine learning in environmental change and its limitations. Through a literature search, we identified applications such as data-driven climate models and remote sensing. This includes enabling assessment, action, learning, and implementation and linking environmental change to the Sustainable Development Goals.

We found no documented machine learning implementations toward achieving the 1.5^0 C temperature boundary, leaving scope for opportunities and threats. We also identify a range of open questions around the potential partnerships with machine learning research and commercialization in this area. This is reflected in the areas where machine learning is currently being applied. However, the broader contexts in which these three use cases sit are promising. Indeed, we are likely underestimating the uptake of machine learning in these areas due to the search terms used. In practice, we find a selection of reports and consultancies explicit in their application of machine learning. We identified twelve use cases related to using machine learning in environmental change.

Future Directions
We envision a plethora of future research opportunities at the intersection of zero-carbon strategy formulation and machine learning. This includes the development of comprehensive solutions and platforms tailored to the internal and external operating context of organizations. We delve into ways in which the insights from this research can be put into action and used to drive organizational impact. There is still room to advance more sophisticated machine learning techniques designed to effectively utilize large, complex corporate datasets in climate change and zero-carbon strategy formulation for organizations. Public data sources often have gaps or information tailored to financial considerations (e.g., energy consumption information might be expressed in different units and levels of granularity than desired). It will be beneficial to tap into the expertise of organizations working towards zero carbon to determine the data and data transformations that could be necessary.

About the Author

Vishwanadham Mandala is an IEEE Senior member with 20 years of industry experience in Big Data, AI & ML, Data integration and Data Architecture. He has a Bachelors and Master in CSE, a Master in Data Science and currently pursuing a PhD in CSE. He has 10 patents in diverse areas, granted in India, UK and Germany. He has 20 research papers published in Elsevier, Springer, MDPI and other journals. He has been a reviewer for many organizations.

IEEE-USA Cruise 2024

Set Sail for the Alaskan Frontier with IEEE-USA

Adventure Awaits on a 7 Night Cruise Combining Networking, Learning and Fun

WASHINGTON, Dec. 18, 2023 /PRNewswire/ -- After the tremendous success of the inaugural 2023 Cruise, IEEE-USA is thrilled to announce we'll be setting sail for a second time 9-16 September 2024. This time guests can expect to enjoy brisk, clean air and breathtaking scenery alongside the incredible line-up of speakers and networking opportunities while journeying to the Alaskan Frontier!

OV, Ovation of the Seas, Alaska, Hubbard Glacier, North Star, Mountains, Scenic View Of Snow Covered Mountains Against Blue Sky, scenery, ice, icy, upper deck aft view. "This image is an artistic rendering of Ovation of the Seas. Features vary by ship."

"Our 50th Anniversary Cruise was incredibly popular," shared Keith Moore, 2024 IEEE-USA President. "Hosting a unique event like this provided an opportunity for us to come together, expand our horizons and enjoy new experiences collectively. In 2024, we look forward to building on the success of our first cruise."

IEEE-USA will be hosting a 7-night Alaska Cruise aboard Royal Caribbean's *Quantum of the Seas*. We will disembark from Seattle, WA, with stops at four beautiful ports along the way and two days at sea. Plus, if you've never seen the Northern Lights, this may well be your chance as we are cruising during "Aurora Season".

With stops in Alaskan towns Sitka, Skagway and Juneau, guests can get a front-row seat to snow-capped mountains and awe-inspiring glaciers, while also taking in the history, cuisine, indigenous culture, and wildlife that this region has to offer. The last stop will be in Victoria, British Columbia - Conde Nast's #1 City in the World - one last chance to collect memories of whistling orcas, treasured totems, maritime sights and histories.

"In addition to visiting some of America's most iconic and majestic scenery in Alaska," shared 2023 IEEE-USA President Ed Palacio, "Next year's journey will provide an exciting opportunity to network, explore new ideas and bring cutting-edge knowledge to attendees. Plus, it will be packed with fun-filled activities and experiences."

Cruise attendees will experience exclusive events, food and live entertainment, nightly group dining, and informative, fast-paced and insightful "Lightning Sessions" on a variety of cutting-edge topics, but guests will also have time to enjoy this stunning ship and all it has to offer.

The *Quantum of the Seas* offers inventive features like the North Star observation capsule, providing breathtaking views from above the ship. It also boasts bumper cars, surfing and skydiving simulators. Entertainment options range from Broadway-style shows to robotic bartenders at the Bionic Bar. Look forward to dining with specialty restaurants and dynamic culinary experiences. *Quantum of the Seas* also offers indoor and outdoor activities like rock climbing, pools, and spa services. Whether you're looking for an engaging adventure or a cozy relaxing getaway, you'll find it here.

To book your stateroom today or to learn more about IEEE-USA's 2024 Alaskan Cruise, visit **cruise.ieeeusa.org**.

Want to get your company involved in this unique opportunity? Sponsorship packages providing 9 months of visibility online and in-person visibility on the ship are also available at **cruise.ieeeusa.org/sponsorship**.

About IEEE-USA:
IEEE-USA serves the public good and promotes the careers and public policy interests of over 150,000 engineering, computing and technology professionals who are U.S. members of IEEE, the world's largest technical professional organization.

AI in Fraud Detection

Artificial Intelligence in Fraud Detection and Prevention Transforming Financial Security in Accounting
By Manoj Kumar Vandanapu

Abstract
Artificial Intelligence (AI) is revolutionizing fraud detection and prevention within the Finance and accounting domain. This review article examines the transformative impact of AI technologies on accounting firms, focusing on the benefits, challenges, and future prospects of AI adoption. With AI's potential to enhance accuracy, efficiency, and scalability in detecting fraudulent activities, the finance and accounting sector is experiencing a significant shift towards more secure and reliable financial practices.

Introduction
In today's interconnected and rapidly evolving financial landscape, the integrity and security of accounting processes are paramount. Financial fraud poses a significant threat to businesses, financial institutions, and investors, undermining trust in the reliability of financial information and causing substantial economic losses. Traditional approaches to fraud detection, reliant on manual processes and rule-based systems, have proven inadequate against sophisticated fraud tactics. The emergence of AI offers advanced tools and techniques to combat fraud effectively, heralding a new era in financial security.

Historical Context and Evolution of Fraud
The history of financial fraud is as old as commerce itself, with documented cases dating back centuries. Over time, the methods and scale of fraudulent activities have evolved significantly, propelled by technological advancements and globalization. The modern era's proliferation of digital transactions and complex financial instruments has created new opportunities for fraudsters. From corporate embezzlement to securities fraud and money laundering, the spectrum of financial crimes is vast and diverse, posing constant challenges to regulatory authorities and law enforcement agencies worldwide.

Traditional Approaches vs. AI in Fraud Detection
Conventional methods of fraud detection, such as manual audits and rule-based algorithms, have inherent limitations that make them ill-suited to cope with the dynamic nature of fraudulent activities. Human auditors often struggle to sift through vast amounts of data to identify irregularities, leading to missed opportunities for timely fraud detection. Moreover, rule-based systems rely on predefined thresholds and criteria, making them susceptible to evasion tactics employed by sophisticated fraudsters.
Recognizing these inadequacies, the financial industry has increasingly turned to AI as a powerful tool for enhancing fraud detection and prevention capabilities. AI encompasses a broad range of technologies, including machine learning, natural language processing, and predictive analytics, enabling computers to perform tasks that traditionally required human intelligence. By leveraging AI algorithms and techniques, organizations can analyze large volumes of data in real-time, identify patterns indicative of fraudulent behavior, and proactively mitigate risks before they escalate into significant financial losses.

Benefits of AI in Fraud Detection and Prevention
AI-driven solutions offer several benefits for fraud detection and prevention, including increased accuracy, efficiency, and scalability. AI algorithms can analyze vast amounts of data with greater speed and precision than human auditors, reducing the time and resources required for fraud detection. Moreover, AI enables organizations to detect subtle patterns and anomalies that may go unnoticed by traditional methods, thereby enhancing the effectiveness of fraud prevention efforts. Additionally, AI-driven systems can adapt and evolve over time, learning from past experiences to continuously improve their performance and effectiveness.

Challenges in AI Adoption
Despite its numerous benefits, the widespread adoption of AI in fraud detection and prevention faces several challenges. These include data privacy and security concerns, integration issues with existing systems, and regulatory compliance requirements. Ensuring the privacy and security of sensitive financial data is paramount, yet AI-driven solutions may inadvertently expose organizations to new risks if not implemented and managed effectively. Integrating AI technologies into existing accounting systems can be complex and costly, requiring significant investments in infrastructure and staff training. Moreover, regulatory frameworks governing the use of AI in financial security are still evolving, posing compliance challenges for organizations seeking to leverage AI for fraud detection and prevention.

Stakeholder Perspectives
Stakeholders in the Finance and accounting industry, including accounting professionals, AI technology vendors, and regulatory experts, hold varied perspectives on AI adoption. Accounting professionals recognize AI's potential to revolutionize fraud detection but express concerns about job displacement and the need for upskilling. AI technology vendors emphasize the benefits of AI in improving fraud detection efficiency and accuracy, offering support and training for implementation. Regulatory experts advocate for responsible AI usage, highlighting the importance of data privacy and compliance requirements.

Future Outlook
The future outlook for AI adoption in accounting firms is optimistic, with trends pointing towards increased investment in AI technologies, greater emphasis on data security and compliance, and the integration of AI into core accounting processes. Small and medium-sized firms are expected to explore new frontiers in AI adoption, such as expanding AI applications beyond fraud detection and integrating AI with emerging technologies like blockchain. Additionally, medium-sized firms will prioritize the adoption of AI-powered predictive analytics tools, enabling them to harness the predictive capabilities of AI for informed decision-making and risk management. Large firms are anticipated to adopt advanced AI algorithms and develop industry-specific solutions tailored to their unique needs and challenges.

Conclusion
AI is transforming fraud detection and prevention in the accounting sector, offering unprecedented levels of accuracy, efficiency, and scalability. By addressing challenges related to data privacy, integration, and regulatory compliance, accounting firms can capitalize on AI's potential to enhance financial security and uphold the integrity of financial reporting processes. This review highlights the transformative potential of AI in combating fraud and fostering trust and reliability in financial information. Future research should explore the long-term implications of AI adoption, including its impact on organizational culture, workforce dynamics, and regulatory frameworks, to ensure the effective and responsible integration of AI technologies in accounting.

References
Afriyie, J. K., Tawiah, K., Pels, W. A., Addai-Henne, S., Dwamena, H. A., Owiredu, E. O., ... & Eshun, J. (2023). A supervised machine learning algorithm for detecting and predicting fraud in credit card transactions. Decision Analytics Journal, 6, 100163.

Alarfaj, F. K., Malik, I., Khan, H. U., Almusallam, N., Ramzan, M., & Ahmed, M. (2022). Credit card fraud detection using state-of-the-art machine learning and deep learning algorithms. IEEE Access, 10, 39700-39715.

Hassan, M., Aziz, L. A. R., & Andriansyah, Y. (2023). The role artificial intelligence in modern banking: an exploration of AI-driven approaches for enhanced fraud prevention, risk management, and regulatory compliance. Reviews of Contemporary Business Analytics, 6(1), 110-132.

Choi, D., & Lee, K. (2018). An artificial intelligence approach to financial fraud detection under IoT environment: A survey and implementation. Security and Communication Networks, 2018.

Dwivedi, Y. K., Hughes, L., Ismagilova, E., Aarts, G., Coombs, C., Crick, T., ... & Williams, M. D. (2021a). Artificial Intelligence (AI): Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy. International Journal of Information Management, 57, 101994.

About the Author:
Manoj Kumar Vandanapu is a distinguished finance professional known for his expertise in corporate finance, finance transformations, and financial reporting. With certifications including CPA and Chartered Accountant, he has significantly contributed to the finance industry through innovative financial models and advanced technological integrations in financial processes. Manoj has played pivotal roles in fortune 500 organizations, leveraging AI, machine learning, and robotic process automation to drive efficiency and accuracy. He is an active member of prestigious organizations like IEEE senior member, a respected author, and a recipient of numerous accolades, including the Top Finance Voice badge on LinkedIn. His leadership and strategic insights continue to shape the future of financial management and reporting.

What is Far Memory?

Far Memory Unleashed: What is far memory?
By Subhadip Kumar

In-memory databases, which offer super-fast transaction processing capabilities for OLTP systems and key-value store DBs, are gaining popularity. Some examples of well-known in-memory databases are SAP HANA, VoltDB, Oracle TimesTen, MSSQL In-Memory OLTP, and Memcached. Some less-known ones are GridGain, Couchbase, and Hazlecast. The demand for DRAM has skyrocketed due to the use of in-memory databases for SAP S/4 HANA, big data, generative AI, and data lakes. One of the main challenges in large computer clusters is the limited availability of main memory. For instance, the maximum DRAM for SAP HANA on AWS is 24 TB, which costs $63,000 (US) per month or about $750,000 (US) per year. On-premises, the maximum DRAM is often 12~18TB.

Moore's law, which states that the number of transistors in an IC doubles every two years, is no longer valid. This means that main memory is becoming more and more of a bottleneck for in-memory databases. A potential solution was Intel's Optane memory, a non-volatile memory that had similar performance to DRAM at a lower cost, by enabling load/store access at a cache block granularity. However, Intel discontinued Optane, ending its effort to create and market a memory tier that was slightly slower than RAM but had the advantages of persistence and high IOPS.

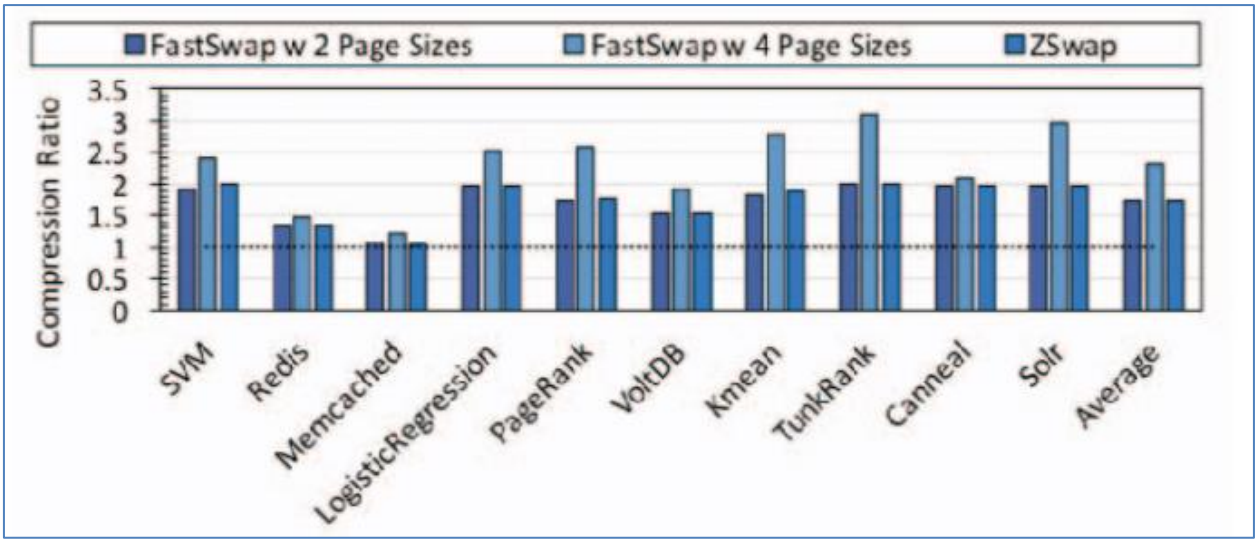
A possible alternative that is being explored both academically and commercially is far memory or memory virtualization. Far memory is a memory tier between DRAM and Flash that has a lower cost per GB than DRAM and a higher performance than Flash. Far memory works by disaggregating memory and allowing nodes or machines to access the memory of a remote node/machine via compute express link. Memory is the most contested and least elastic resource in a datacenter. Currently, servers can only use local memory, which may be scarce on the local system but abundant on other underutilized servers.

With far memory, local machines can use remote machine's memory. By introducing far memory into the memory tier and moving less frequently accessed data to far memory, the system can perform efficiently with low DRAM and reduce the total cost of ownership. Far memory uses remote machine's memory as a swap device, either by using idle machines or by building memory appliances that only serve to provide a pool of memory shared by many servers. This approach optimizes memory usage and reduces over provisioning.

However, far memory also has its own challenges. Swapping out memory pages to remote machines increases the failure domain of each machine, which can lead to a catastrophic failure of the entire cluster. Moreover, swapping over RDMA causes poor latency and throughput due to head-of-line blocking. There are some recent developments that can address these issues.

1. **FastSwap:** FastSwap designed by a group of researchers from UC Berkeley, which is optimized for far memory through RDMA and is transparent to applications and developers. It achieves remote page access latencies of <5 μs, enabling applications to access far memory at 10 Gbps using a single thread and 25 Gbps using multiple threads.
2. **Infiniswap:** A group of researchers from the University of Michigan developed INFINISWAP on an RDMA cluster by dividing the swap space of each machine into many slabs and distributing them across remote machine's memory. They experimented on VoltDB, Memcached, PowerGraph and observed a performance improvement of 4x over disk. This is also transparent to applications and OS.
3. **ZSwap:** Google developed a software-defined far memory by storing cold compressed pages in memory using ZSwap and implementing far memory in software. Compressing memory pages allows us to pack more data in memory (i.e., lower cost per GB) at a cost of increased access time. At a high level, this is no different from any other far memory implementation from a TCO perspective. ZSwap, being a software approach, can be deployed with much shorter time and lower effort, and does not require cross-vendor collaborations as there is no need for any special hardware (e.g., NVM).
4. **AIFM:** In another study by researchers from Brown University, they made far memory available to the local machine using a simple API. The concept is called application-integrated far memory (AIFM). It avoids read and write amplification that paging-based approaches suffer. They claim that AIFM outperforms FastSwap, a state-of-the-art kernel-integrated, paging-based far memory system by up to 61x

Figure 1: FastSwap vs ZSwap compression ratio



To sum up, the exploration and progression of far memory represent a highly promising pathway for transforming the data center landscape. A pivotal factor contributing to the potential of far memory is the emergence of groundbreaking technologies like Compute Express Link (CXL). Engineered to bolster high-performance computing and ensure memory coherency, CXL has the capacity to revolutionize how systems access and utilize memory resources. The integration of CXL with far memory architectures opens up novel avenues for improving data processing, storage efficiency, and overall system performance. Noteworthy is the capability of Kubernetes to harness far memory in tandem with CXL, further expanding the horizons of efficient and innovative computing solutions. Far memory, in this context, offers an opportunity to address the high memory costs associated with SAP HANA.

About the Author:

Subhadip Kumar is a highly experienced professional with over 18 years in Information Technology. He is also a senior member of IEEE. As a Senior Technology Specialist at a leading Class I railroad company in North America, Subhadip has dedicated more than a decade to advancing the railroad industry's technological capabilities. Throughout his career, Subhadip has consistently been at the cutting edge of technological innovation, passionately exploring and adopting new technologies. His commitment to staying updated with the latest advancements ensures that he remains a proactive and visionary force in his field. In his role as a technology specialist, Subhadip combines technical expertise with a comprehensive understanding of business operations. He frequently contributes articles on technology advancements to various trade journals globally, sharing his knowledge and insights with a broader audience. Subhadip's professional growth extends beyond the IT sector, as he has deeply immersed himself in the complexities of the railroad industry. This thorough understanding allows him to seamlessly align business objectives with IT solutions, effectively bridging the gap between the two. His career is marked by technical proficiency and an ability to adapt to the ever-evolving industry landscape. Subhadip's integrated knowledge of technology and business uniquely positions him to translate business needs into impactful IT solutions. His unwavering commitment to excellence and innovation highlights his leadership at the intersection of technology and business strategy.

Policy Migration Tools

Migration tool in the policy administration space: The secret behind its virality

By Sharmila Devi Chandariah

In today's Insurance industry, adaptability and being ahead of the curve is more important. Insurance companies are moving towards modernization of their legacy systems for which they need to migrate their legacy data into new policy administration systems designed to empower Property and Casualty to meet their needs in the current rapidly growing and changing industry with efficient underwriting and agile policy and product management. Since current insurers legacy

system solutions are 30+ years old, this leads to inconsistent customer experiences and an unstable cost structure. Thus legacy systems are limiting our ability to efficiently analyze the data, make quick product changes, hence insurers are migrating the data in the legacy systems towards Policy administration systems.

Administration systems used the Accelerator approach which would retrieve the policy data from the legacy system for those policies coming up for renewal that day and store them in a predefined XML-formatted file on their renewal. The accelerator then takes the renewing policies and uses the respective APIs to instruct the administration system to add those policies to the defined renewal workflows. This results in relatively low risk to the project, but the trade-off is data in multiple systems (e.g., endorsements of in-force policies - until runoff, remain in the legacy systems and all other entries are in Policy Center). This also means the history will remain on the legacy system, delaying its retirement typically up to one year.

In today's world migration tools have become viral to ease the migration process by loading the data into renewal jobs and then process regular renewals. The extract process populated the input interface with data from legacy policy management systems. Migration tools create renewals in the policy administration system and store them in the output interface. The schema for interface varies the input interface as the source of transformed data and output interface as target for reconciliation data.

Migration tools employ advanced algorithms to automatically map data fields from legacy systems to corresponding fields in Policy Center eliminating the need for manual mapping, significantly reducing the time and effort required for migration. Facilitating accuracy, consistency and compliance with regulatory requirements this tool also conducts comprehensive validation checks to detect anomalies. Recognizing the diverse needs of insurers, the Policy Migration Tool offers extensive customization options to align with their unique business requirements, ensuring a personalized migration experience. Insurers can opt for incremental migration strategies, enabling them to migrate policies in batches rather than all at once. This phased approach allows insurers to manage the migration process more efficiently, mitigate risks, and minimize disruptions to ongoing operations.

What's next ...

By automating manual tasks and streamlining processes, the Migration Tool accelerates the migration timeline, enabling insurers to realize the benefits of Policy Center sooner. Through rigorous validation checks and data cleansing mechanisms, the tool ensures that migrated data is accurate, consistent, and compliant with regulatory standards, mitigating the risk of non-compliance penalties. By reducing manual efforts and minimizing the likelihood of errors, insurers can achieve cost savings associated with migration activities, including staffing, training, and remediation efforts. A smooth migration process minimizes disruptions to operations, ensuring continuity of service for policyholders. Insurers can maintain elevated levels of customer satisfaction throughout the migration journey. With legacy constraints lifted, insurers can leverage the advanced capabilities of Policy Center to innovate rapidly, launch new products, and adapt to evolving market demands more effectively.

About the author:

Sharmila Devi Chandariah is a Senior IEEE member and member of IEEE Computer Society, has been working in the computer software field over 13 years. She is a Senior Technical Lead with extensive industry experience currently working in Capgemini America in the fintech industry. Her expertise lies in implementation of applications in both the banking and insurance industries and migrating legacy systems to modernized policy administration systems. With her passion for automation, she delivers solutions to current business problems in her area of expertise, leveraging Generative AI.

Congressional Visit 2024

My experience with CVD 2024

Congressional Visit Day (CVD) 2024 was organized by IEEE USA on 11th of April 2024. It was a two-day program comprising more than 160 participants across different states from the USA. The first day started with an orientation session from 2 PM to 5 PM on the Hart Senate building at the Capitol Hill. On the following day, we had a power packed agenda to meet Senators and House representatives or their staff officers on April 11th. It was my first time participating on the congressional visit's day at Washington DC, so I was excited and a little apprehensive at the same time. We were well briefed on the agenda prior to arriving in DC and so I wanted to make a point to show up as I am very strongly aligned with each of the three bills on the agenda that we wanted to ask for legislative support from our local representatives from congressional districts.

Erik from IEEE USA gave us a very warm welcome at the orientation. I believe it was a very well-organized event. I was able to meet IEEE members and fellows from various states and introduce myself and share my scope of work and learn from others in the field. I was pleasantly surprised to see a healthy mix of young professionals as well as IEEE luminaries. I met IEEE President Thomas Coughlin and IEEE Computer Society President Jyotika Arthavale. I was also elated to meet other IEEE Region presidents and past chairs.

As the orientation session started , we were greeted and provided with a brief overview of what to expect from these meetings with the house representatives. We were provided some tips and tricks to make our presence felt in social media , which I thought was pretty cool.

Russel Harrison , Managing Director of the IEEE USA , gave a very good presentation of why we are here and why we need to raise our voice in support of the 3 bills. The first one was about investing in the future of US Science and Technology through increased funding for colleges and universities to allow consistent and continued research and education across all levels to ensure continued success of the CHIPS ACT of 2022. The Second was about support for diversifying and expanding access to AI systems through the CREATE AI ACT that allows research universities with consistent funding to procure compute power to carry out AI based research. This would ensure that the benefits of AI are not confined to a few corporations who have the monetary strength to pursue the research. The last but not the least was about strengthening America's workforce with the Keep Stem Talent Act. This was not only about generating enough STEM oriented domestic workforce here in the USA through continued sponsorship of Technology colleges and programs , but also voicing concerns on the need of more employment based green cards that alleviate the concerns of temporary workers from either level. There was an optional Town Hall organized by the IEEE president , which I had to skip for logistical reasons.

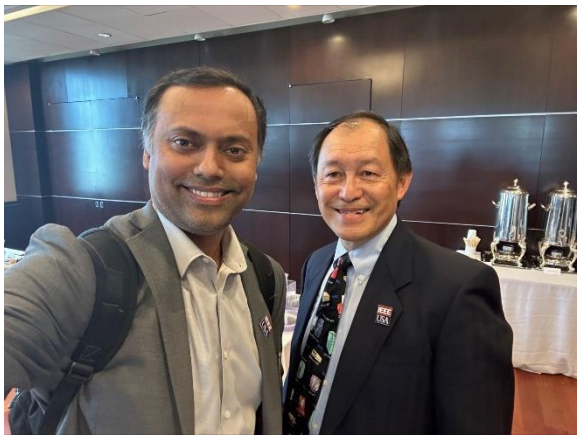
Day 2 started with an early and optional breakfast of all the members . This is another fantastic opportunity to meet and explore IEEE luminaries. This includes eminent professors like Gora Dutta from LA. I was the lone representative from Illinois as my counterparts from my state could not show up due to unavoidable circumstances . This was followed by meetings across the Senate buildings (The Hart Senate Buildings) and the offices of the house of representatives. The meetings were unique experiences and it felt very gratifying to represent myself and speak about our local community and my story at these meetings. In addition to the items already on the agenda. It was fascinating to meet with colleagues in my industry from other states and network with them. It was good to listen to their stories and experiences from the field as I discussed mine. Some of the tips from the IEEE USA colleagues came in very handy especially about wearing comfortable shoes as I walked more than 16000 steps in a single day covering my congressional meetings across the Capitol Hill.

My experience of the visit was nothing short of extraordinary. It was a very unique experience to meet and speak with local representatives and voice our concerns and hear from them. At the same time , it was a great event to meet and network with exceptionally talented engineers and academicians who have been able to demonstrate leadership at the top of their field. Last but not the least , while the weather was not very sunny , it did not play a spoilsport as it promised to rain however it did not 🙂.

Here are some pictures from the event.

With Jyotika Athavale & Tom Coughlin

With Gora Datta



With

Russ Harrison of IEEE-USA

Prasenjit Banerjee is currently serving as a Director of architecture at Salesforce for Data Cloud. He has 16 years of Experience in architecture, Cloud Computing , API Security, Cybersecurity, and Microservice architecture. He has an MBA from University of Chicago Booth School of Business. He is involved with the IEEE Computer Society to learn about the new research in Data Science and AI and also share his learnings, while working for one of the pioneers in Data, Cloud and AI in the field.

Prasenjit lives in Naperville with his wife Tamalika and two kids who are now 5 and 7 years old, an English Creme Golden retriever named Gogol and a Persian cat named Tintin . When Prasenjit is not working, he enjoys the outdoors by either biking or running.

PowerFilms Trip Report

Site Visit to PowerFilm Ames, Iowa

On Thursday, April 11 2024, the Central Iowa Section of the IEEE Region 4, organized a site visit to Powerfilm Inc, 287 XE Place, Ames, IA 50014. PowerFilm Solar

The visit was attended by the Student Branch of the IEEE at Iowa State University and IEEE members who live in Central Iowa. The visit was conducted by Dr. Dan Stieler, PhD, President of PowerFilm. Dr. Stieler received his Ph.D. in Electrical Engineering from Iowa State University in 2008. His technical expertise lies in both solar materials and the electronics that are paired with the solar.

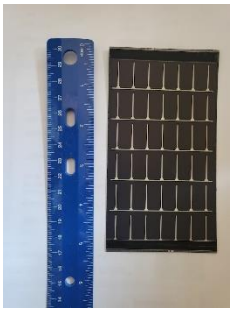
The one-hour visit was extremely informative and a real eye-opener for the 15+ audience members. Dr. Stieler gave us a detailed tour of the facilities, including a hands-on demonstration of laminating, electrode fabrication, and deposition in the expansive facilities. He showed us the light-exposure testing equipment for validating reliability of modules.

PowerFilm specializes in designing, engineering, manufacturing, and assembly of custom solar solutions. A US-based company with over 200 staff years of technical expertise, PowerFilm delivers innovative remote, portable power solutions to meet client needs. PowerFilm's proprietary manufacturing provides custom amorphous silicon panels that work in any light environment, including the indoor, industrial lighting of many IoT sensor applications. PowerFilm is one of the few remaining U.S. companies manufacturing thin silicon panels and is constantly innovating with new applications and customers. They have a significant presence in the area of portable marine power and custom-made power solutions for golf cars.

We got to see the custom solar panels that are being used in the transportation industry as well as the flexible panels PowerFilm installed on tents for the U.S. Army. Since PowerFilm's beginning over 30 years ago, the US Department of Defense was their largest lifetime customer.

At the end of the tour, we were each given a sample 3" x 5" flexible solar panel to take home as a memento of this delightful afternoon!

Contributed by
Rana Biswas
Vice Chair, Central Iowa Section of the IEEE, Region 4



PowerFilm flexible Solar Panel (see more at Rollable Solar Panels (powerfilmsolar.com))

MD Report

Membership Development

by Sasidhar Tadanki, Region IV MD Chair, stadanki@ieee.org

Membership development (MD) is crucial in ensuring the future growth of IEEE and its members. According to the IEEE MD manual, membership development is a function of recruiting new members and retaining existing members. This is accomplished by ensuring that you, the members, receive the "value" that you expect from being an IEEE member. IEEE is divided into ten regions; each has many sections, and some sections have subsections. To receive the "value" that IEEE can provide, the first step is to understand which region and Section you belong to. As a next step, I strongly encourage you to contact the Section leadership and Region leadership to learn about the activities and opportunities in your local area.

Membership Statistics:

As of April 2024, Region IV has 14,605 members. Compared to March 2024, this is an increase of 541 members. We are similar to what we were at the same time last year. We had 83 more members this year than in April 2023. This is consistent with the past trends, and we hope to continue and grow. At the start of the membership year, MD goals for recruitment and retention are established for each Section. Region IV has achieved 92% of our retention goal and only 65% of our recruitment goal this year. Even though this is a very positive trend, much work still exists to exceed our goals. Figure 1 shows how each Section is doing with their retention goals as of April 2024. Figure 2 shows each Section's performance with the recruitment goals. At the end of the year, Region IV recognizes the Large, Medium, and Small sections that achieve the highest membership growth goals.

Membership Value:

As a valued member of an esteemed organization, IEEE members are given new resources, valuable opportunities, and many discounts to help them in their professional endeavors.

To uncover IEEE member benefits that are most relevant to you, Use the Global Benefits finder and select your current career phase and country/region. Your results page will render a list of key IEEE member benefits that can help you accelerate your career plans and help you grow as a technology professional.

One of the key focus areas for the sections and the region will be promoting elevations in grades for our members. Many events are happening to elevate members to senior grade. You should first contact your local Section MD regarding membership elevation. If this is not possible in your section, please get in touch with your section leadership or Howard Wolfman, Vickie Ozburn, and MD Committee to assist with this process. Don't hesitate to contact Dr. Biswaranjan Senapati, Region IV MD Vice-Chair, or me with membership questions.

Have you considered a Society membership? Now may be the time to move forward. Most societies offer half-yearly pricing around this time of the year.

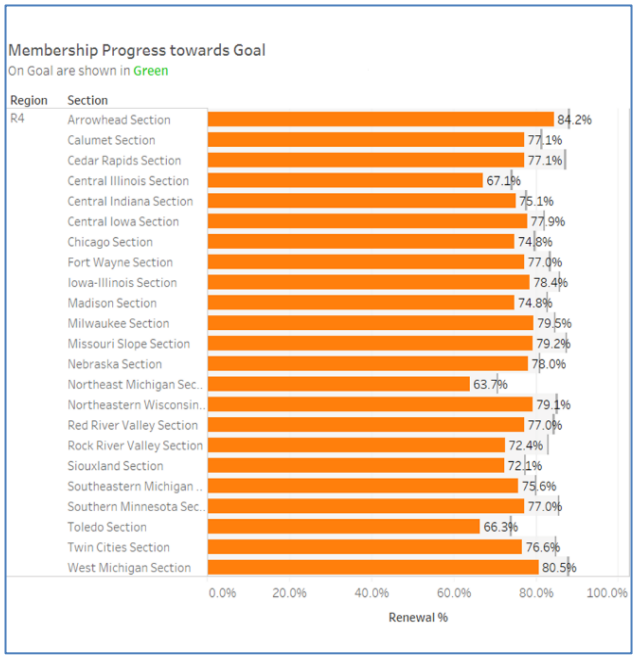


Figure 1: Retention progress for each section

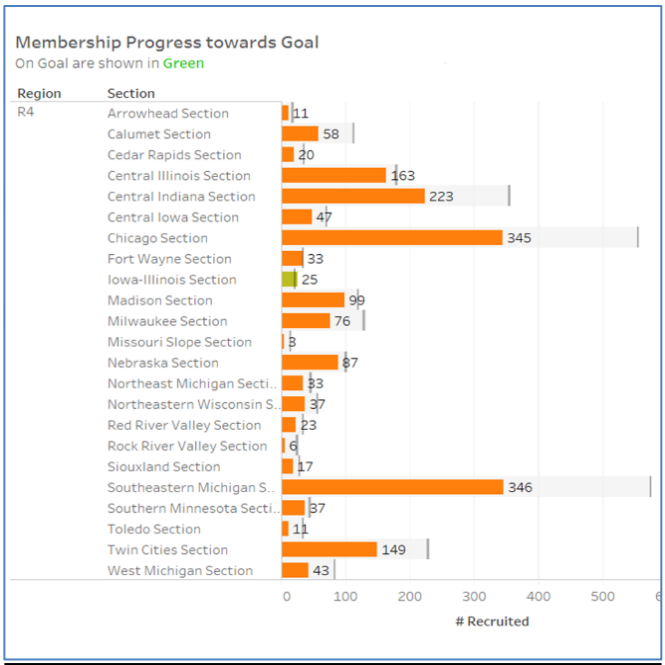


Figure 2: Recruitment progress for each section

Large Section News

Here is what is going on in the region. If anyone has any updates or corrections, please send them to me. – Dave Hendrickson

Large Section News 2024 May

The Chicago Section recently lost Hubert "Hugh" Edfors and Bernie Sanders. Both have been long time members. Bernie has been a major volunteer to the IEEE. The Interdisciplinary Conference on Electrics and Computer (INTCEC 2024), which will take place in Romeoville, Illinois during 11 – 13 June 2024. This is an interdisciplinary conference to discuss the scientific and engineering issues to achieve complete systems for the future.

Southeastern Michigan (SEM) Section recently hosted EMC Fest 24 on May 16th at the Embassy Suites in Livonia, Michigan. On June 1st, from 10 to Noon, the Southeastern Michigan (SEM) Section hosted an in-person Senior Member Elevation event at Oakland University in Rochester, Michigan. The ROBOFEST World Championship was held on 9 - 11 May 2024 at Lawrence Tech University in Southfield, Michigan. The SEM Section has been supporting this event since its inception, and is active with the technical judging on 11 May 2024. This is a great STEM program for students from 4th to 12th grade. *(Note added by Sharan Kalwani (editor): This was the 25th anniversary of ROBOFEST).*

The **Twin Cities Section** has a Coffee and Donuts – This is primarily a virtual event held the 2nd Friday of the month at 4:30 PM. The next event is 14 June 2024 at 4:30 PM. The Twin Cities Section was involved with the Data Derby 2024. This comprises a Datagon Debate and Datathon Competition 20 April 2024. This is a 4-to-5-week competition where students analyze data and find solutions to questions. This program is open Minnesota high school, undergraduate, and graduate students. To compete as a "professional" data scientist you must register though the IEEE Twin Cities section. The Twin Cities section was involved in the judging.

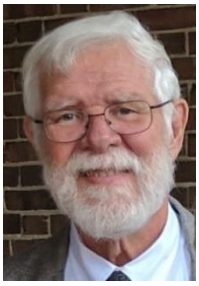
The **Central Illinois Section** holds its ExCom meetings on the first Tuesday of the month except for November. Please drop by the next meeting 4 June 2024 via WebEx. The next meeting was at the GatesAir manufacturing for a plant tour and presentation on 20 May 2024. The presentation covered various worldwide digital formats for terrestrial broadcast transmissions. *(Note added by Sharan Kalwani (editor): See their report elsewhere in this edition)*

The **Central Indiana Section** was just recognized for membership growth for 2024 by region 4. The section is looking for PACE Chair, Membership Development Chair, and Communications Society Chapter Chair. Of course, if you are interested in any volunteer position with any section, chapter, or group, please reach out for your talents are always welcome. The Centra Indiana Section recently had a DIY Heart Kit event for Valentines day. This was a fun event that offered the attendees an opportunity to socialize and make a fun project.

The **Milwaukee Section** has several technical presentations scheduled in June 2024. Controlling Unwanted Energy: Shielding, Absorbing is on 6 June 2024 and Impact of Electric Vehicles on AM Radio Reception is on 20 June 2024. Both of these events are virtual. The Milwaukee Section was a partner for the Milwaukee Cybersecurity Summit held 2 May 2024. This is a top-rated InfoSec Conference Worldwide. This was a full day event. The 2024 Nexus Conference is November 8-10, 2024 in Milwaukee, WI. This event is for students and young professionals in the MidWest.

Medium Section News

Medium Sections News, May 2024
By Co-Chairs Hamid Vakilzadian and Tom Kaminski



Medium sections of Region 4 are Calumet, Madison, Nebraska, Northeastern Wisconsin, and West Michigan, whose membership is under 1000, mainly in the range of 500. These sections are very active in serving their local memberships and attending Area and Region Committee Meetings to implement new strategies and activities to serve their members better. In April 26-28 of 2024, four representatives, one from 4 of the sections, attended the Regin Committee Meeting that was held in Minneapolis, Minnesota, where topics such as Membership Engagement, Section Vitality, Non-Member Outreach, and Student Branch connections and activities, in addition to issues such as Ad hoc Committee report, Conference and event Planning information were provided to the attendees. During the Award and Recognition section of the Program, our own Co-Chair, Tom Kaminski, was presented with the Jack Sherman Award to recognize his professional and technical abilities and outstanding and noteworthy contributions to IEEE, their communities, fellow professionals, and humankind. Congratulations, Tom, on the job well done!

The following is brief information for the activities of the medium sections mostly from the first quarter of 2024.

Calumet Section
The Calumet section held 10 seminars, lab tours and workshops for its memberships. These included tour of Power and Robotics lab, exploring electromagnetic energy with Alexander quality, and workshops on soldering, building a simple PC, and a seminar in the area of ethics, Power Equipment Fundamentals, and a Bowling Night social as a fun activity and networking opportunity of its memberships. The activities were in addition to the sections' Excom meetings.

Madison Section
The Madison Section was very active during the first quarter of 2024. The section held 7 in-person meetings that highlights of them were a very successful MakerSpace Talk and Tour, call for volunteers to help at the MakerSpace, KidWind, Medicine and Biology, Consciousness presentations in addition to the Section's Excom meetings with the following highlights:

KidWind talk was presented jointly by **Allison Bender (**an Outreach and Events Coordinator of Wisconsin Energy) **and Dick Anderson (**Wisconsin KidWind advisor). They provided a brief description of the mission and approach is used by KidWind for developing interest among students, developing energy curriculum and the role wind and solar play as an alternative energy source and competition project among the students. KidWind is a nonprofit organization that helps teachers and students creatively explore the science, technology and implications of a world powered by renewable energy. Audience members attendees in this talk were encouraged to contribute ideas to support and improve the program.

Immuno-Autonomics: A Sea Change in Clinical Care

Despite advances in health sciences, only 25% of the patients with rheumatoid arthritis (RA) achieve adequate success regardless of how their immune target was addressed. To increase the percentage of success, immunologists now rely on technology to regulate the autonomic nervous system (ANS) of the brain, modulate fight-or-flight adrenaline and recovery phases. This is measured best by heart rate variability (HRV) - a technique used to quantify stress, and the software, hardware, and firmware engineering of HRV to significantly upgrade their precision in this area.

A talk by Dr. Holman, a founding rheumatologist at Pacific Rheumatology Associates Inc, a former President of the Northwest Rheumatism Society (2005) and a Clinical Associate Professor of Medicine at the University of Washington presented this thought-provoking topic by applying a cardiovascular platform (ECG) to assess a brain function (ANS) to solve a clinical immunology problem that is well received by the attendees.

Consciousness

The Consciousness presentation was made in December 2023. However, because of the nature of the talk, we wanted to include a brief description of it for the interest of Region 4 members.

The focus of this presentation was on the development of integrated information theory for the study of consciousness. This is a comprehensive theory of what consciousness is, what determines its quantity and quality, and how it emerges from causal structures such as neural networks. The theory provides a parsimonious account of many neuropsychological observations, that among them are why certain parts of the brain give rise to experience and others do not, why consciousness vanishes during slow wave sleep and seizures occurs despite continuing neural activity, and how unconscious processes interact with conscious ones.

This theory has implications for consciousness across development and phylogeny, and predicts which ingredients are necessary and sufficient to construct sentient machines. On the basis of the integrated information theory, Dr. Tononi , the speaker of this presentation, and collaborators have:

1) developed theoretical approaches aimed at defining and measuring the quantity and quality of information integration;

2) addressed the problem of how the activities of functionally specialized areas of the brain can be integrated to give rise to a unified conscious experience and

3) pioneered experimental approaches aimed at characterizing the neural substrate of conscious experience by using neuroimaging and transcranial magnetic stimulation. In several recent experiments,

Dr. Giulio Tononi, MD, PhD, is a neuroscientist and psychiatrist based at the University of Wisconsin-Madison, where he holds chairs in sleep medicine and consciousness science that presented this topic which had wide interest among the attendees.

Pico Workshop at the MakerSpace

The Pico Workshop at MakerSpace that was organized by the IEEE Madison Section was well attended by the students and they appreciated the information they received. Students visiting MakerSpace received answers for their questions about the use of microcontrollers in their projects. MakerSpace which is housed in the former Wendt Engineering Library at the University of Wisconsin provides support for project-oriented introductory engineering and technology courses.

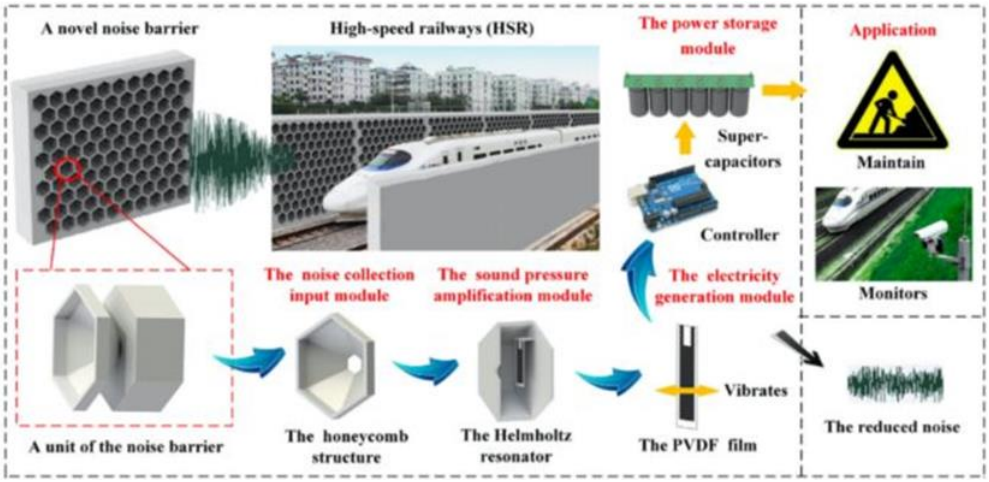
Speaking with Director Lennon Rodgers about the challenges of having so many new engineering students doing projects in one semester, he indicated it is a challenge because many students don't have the basic hands-on skills needed and often don't know how to begin to plan a project. Director Lennon is interested in working with the IEEE Madison Section to recruit volunteers who can help direct students and help them with basic concepts such as project planning, and more advanced electrical fabrication concepts and debugging using the MakerSpace's excellent test equipment.

West Michigan Section

During the first quarter of 2024, the West Michigan Section held 8 in person meetings, where two were seminars, one was related to Tech-Talk: Nanotechnology, ICEMC Testing and the other on an Overview of EMC Standards that were organized by Southeastern Michigan Section Chapter.

Northeast Wisconsin

The Northeast Wisconsin section held four in-person meetings and one virtual meeting during this first quarter of 2024. Among them were Saura Tour, Agrivoltaics (placing Solar Photovoltic Panels Over Cropland), tour of Miller Electric Manufacturing, and Professional Engineering Ethics and Conduct. The section also has planned five activities that includes ExCOM meetings, a presentation on Metamaterials: Wave Filtration to Energy Harvesting and a social event on family day at the New Zoo for fun and networking of its local members. A brief information on *Energy Harvesting* and *Metamaterials* follows.



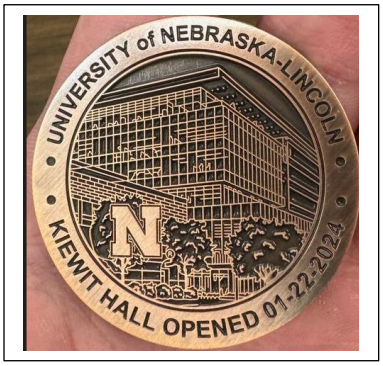
The **Energy Harvesting** presentation provided information on capturing and converting ambient energy into usable electrical power, which has garnered significant attention in recent years as a sustainable solution for powering low-energy electronics and wireless sensor networks. Some of the challenges and opportunities in this area include integration with energy storage systems, optimization for specific applications, and the importance of system-level design considerations for maximizing overall efficiency. Emerging trends such as hybrid energy harvesting systems and self-powered IoT devices underscore the growing significance of energy harvesting in addressing sustainability challenges and enabling autonomous and ubiquitous sensing technologies.

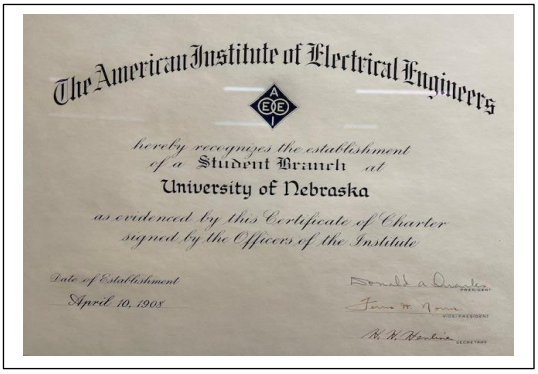
Metamaterials are engineered structures composed of multiple traditional real-life materials, offering exceptional properties that are impossible to find in traditional materials. Acoustic *metamaterials* are traditionally used for wave filtering, acoustic clocking, and vibration control. It is expected this presentation to bring a wide attendance of members in power, communication, and IOT areas.

Nebraska Section

The Nebraska Section, besides holding monthly ExCOM meetings, held two seminars, one in Analysis of Exiting Substations Ground Grids and the second one on Huffman Engineering. The Section is actively planning to celebrate its centennial establishment year, that is tentatively planned for May 2025.

The Lincoln Student Branch, part of Nebraska Section, which probably is one of the oldest, (established in 1908 - picture below) developed a memorial coin on the join collaboration of Student Brach Section and HKN that are both were coordinated by the Electrical and Computer Engineering Department of the University of Nebraska-Lincoln, where one side of the coin shows the joint collaboration and coordination and the other side presents the newly built Kiewit Hall that was opened for holding classes and spaces for the student group collaboration in addition to offices and the labs for the first time in January, 22, 2024.





In addition, Lincoln Nebraska Student Branch of the IEEE Nebraska Section is very active in holding monthly meetings with speakers from the local industry and faculty to extend their horizons and networking with the professionals.

On March 25, 2024, twenty-three (17 undergraduate and 6 graduates) of University of Nebraska students were inducted into the HKN chapter. The event was held in Omaha on the UNO campus this year. This is the largest group to ever become members of our honor society. Congratulations to them and the organizers of this event. The following is a picture from this induction.

Small Section News

Small Sections News, May 2024

East Small Sections:

- Alkesh Patel, Chair & Rakesh Vasudevan, Support Chair
- Sections: Fort Wayne, Northeastern Michigan, Rock River Valley, Toledo

West Small Sections:

- John Johnson, Chair & Rodrigue Rizk, Support Chair
- Sections: Arrowhead, Cedar Rapids, Central Iowa, Iowa-Illinois, Missouri Slope, Red River Valley, Siouxland, Southern Minnesota, Coulee Subsection

Recent Events:

The Iowa-Illinois Section worked with other local organizations to host the annual Spring Kid Hacker Camp at Eastern Iowa Community College in Davenport, Iowa, on March 30th. More than 60 students, parents, and a dozen volunteers attended. Activities included soldering, a VR competition, lockpicking, a cyber escape room, 3D printing, and more.

Small Section leaders gathered in Minneapolis for the Region 4 RCOM meeting on April 26-28, 2024. Meeting face-to-face with R4 volunteers and sharing best practices was a nice opportunity. Some notes from our Small Sections Discussion are broken out below. During 2024, we plan to work on these items and welcome your feedback and suggestions.

- *Collabratec:* It's the only tech platform not banned by other countries. LinkedIn, Discord, and others are banned in some places. If you haven't used it recently (or ever), give it a try! Non-members can join for free. This is a good place for forming social and technical communities.
- *Membership Development:*
  - Reminder! The half-year dues period began 1 March for new members. This is a great value proposition at this point in the cycle—e.g., join in March and receive membership benefits for 9 months at the price of 6. (This does not apply to renewing members, only new or reinstating members.)
- *Recruiting volunteers:*
  - Micro volunteering is good; Have a small task with a definitive end date.
  - If we get students or members to volunteer, they will likely retain membership.
  - The other issue is if you have all your volunteer positions filled but volunteers aren't active.
  - Have volunteers sign up for the R4 volunteer Discord.
- *Event ideas to try:*
  - Hold events throughout your section, not just one geolocation.
  - Try having one day a month for IEEE events, i.e., 3rd Thursday Social.
  - Revitalize and engage the student branches in Section activities.
- *Improving Student Branch Engagement:*
  - HKN (Eta Kappa Nu) is another way to engage students.

        - An induction into an honor society is a 'sticky' way to retain students; HKN is also prestigious for college.
        - HKN can't receive money from the student branches
    - If your student branch counselor isn't responsive, maybe reach out to the Dean or Department Chair.
    - There might be more enthusiasm for student branches at a community college.
    - We can have a paper contest for all R4 students and publish winning papers, give prizes – electronic is cheaper, part of the R4 newsletter or on the website or 'special publication as PDF' (easy lift).
- *Comment:* It would be nice if the groups involved in selling publication subscriptions to universities also advocated for student branches, HKN, etc. We are one IEEE and should mutually support the different OU initiatives.

Job Opening

Colleagues:

Are you interested in a position which truly focuses on teaching, in a collaborative environment, with hands-on, authentic projects for students? The University of Indianapolis is hiring an Assistant Professor / Assistant Professor of Practice in the electrical/computer area.

To view the full advertisement and apply, visit https://hr-jobs.uindy.edu

The R.B. Annis School of Engineering at the University of Indianapolis (UIndy) is seeking candidates for a tenure-track faculty position at the Assistant Professor or Assistant Professor of Practice level with an expected start date of August 2024 (9-month contract). Rank will be based on interest and experience.

Our mission is to use interdisciplinary education to develop modern engineering leaders who create outstanding solutions. The School's mission is accomplished through the DesignSpine, which provides students with an authentic, interdisciplinary design experience throughout their entire academic tenure. These experiences involve projects sourced from external stakeholders, which expose students to design for Six-Sigma, Agile/Scrum, project management, entrepreneurship, leadership, and communication skills development.

The School has programs in computer engineering, computer science, electrical engineering, general engineering, industrial and systems engineering, mechanical engineering, and software engineering.

The faculty in the School are composed of individuals from wide-ranging backgrounds and experiences where collaboration is highly encouraged and supported—including a School structure without department boundaries.

Our diverse team is dedicated to effective and innovative teaching, which include an exciting first-year program, project-based learning, service-learning, and current topics courses. Team building and design activities begin from the first day of classes and are reinforced throughout the curriculum. Our small class sizes and experienced professors allow students to design and direct coursework based on their interests, industry trends, and needs, as well as internship experiences.

The School is true to our institutional philosophy of "Education for Service," where engagement and interaction are key. Faculty contribute to this mission within the walls of the university and in the greater community. In addition to our classroom teaching, faculty are expected to mentor students in DesignSpine projects, as well as engage in service responsibilities.

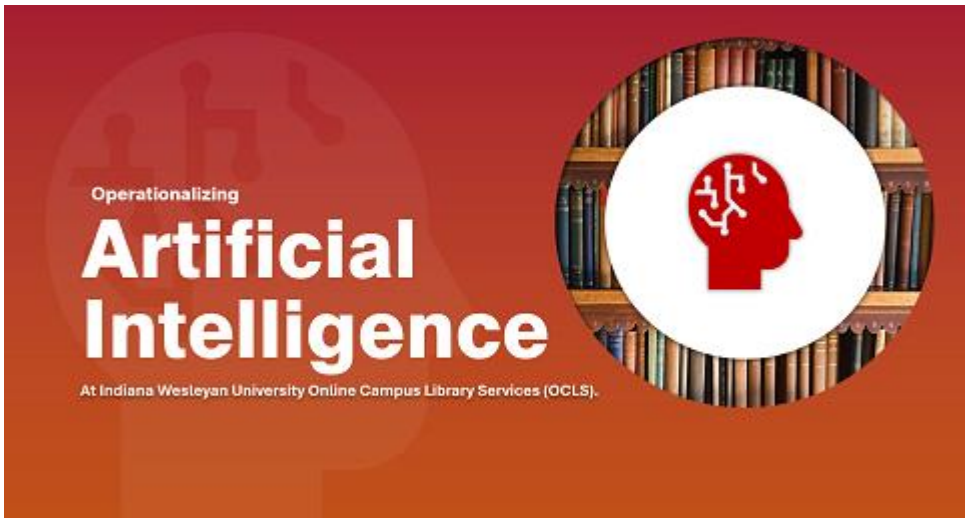
Candidates in the areas of computer engineering, electrical engineering, software engineering, physics, computer science, or closely related fields are encouraged to apply.

Preference will be given to strong candidates who can teach Microcontrollers, Analog and Digital Signal Processing, Introduction to Computer Programming (Python), Computer Architecture, Database Systems, Operating Systems, Cyber Security, and/or any additional EENG 300 to 400 level course listed in the *UIndy Academic Catalog*. Preference will be given to candidates with experience with undergraduate education in the US.

Review of applications will begin immediately, and the position will remain open until filled.

Operationalizing AI

Operationalizing Artificial Intelligence at Indiana Wesleyan University Online Campus Library Services (OCLS)
By Ayebakuro Ngonamondi



In this project, I explored the integration of AI technologies within the context of library services at Indiana Wesleyan University (IWU). The project acknowledges the paradigm shift brought about by AI across various sectors, including education, and seeks to leverage AI to enhance the efficacy and efficiency of library services, particularly within the online learning environment.

The project begins by providing an overview of the topic, highlighting the transformative potential of AI in facilitating access to information, supporting research endeavors, and engaging with user communities within academic institutions. It emphasizes the exponential rise in recognition of AI's potential to enhance administrative tasks and optimize resource management within the educational space.

The topic selection stems from my recognition of AI's critical role in enhancing library services and leveraging their expertise in IT to drive innovation and positive change within IWU's academic community. The project's significance lies in its potential to revolutionize how students and faculty interact with library resources, access support services, and engage in research activities within the online learning environment.

My research delves into the factors influencing the use of AI, such as advancements in computing power, data availability, algorithmic innovations, and interdisciplinary collaboration. It also discusses the specific factors driving the topic of operationalizing AI at IWU, including the growing demand for online learning, the commitment to technological innovation, and alignment with the university's academic mission.

The problem statement highlights the historical evolution of AI and its impact on various sectors, including education. It underscores the need to address specific challenges facing the OCLS, such as complex navigation and search interfaces and limited personalization, by integrating AI-powered solutions.

The proposed AI solutions include an AI-driven recommendation engine, predictive analytics dashboard, and automated document classification and tagging. These solutions aim to address current challenges and enhance the overall user experience within the OCLS.

The integration and implementation plan outlines critical steps to successfully integrate AI solutions within the OCLS, including requirement analysis, technology selection, development and testing, integration with existing systems, user training and onboarding, and rollout and monitoring.

In conclusion, the project emphasizes the transformative potential of AI in enhancing library services within the online learning environment at IWU. By systematically addressing challenges and leveraging AI technologies, the project aims to empower students and faculty members to achieve their academic goals effectively, positioning IWU at the forefront of digital transformation in higher education.

The proposed solution can also be implemented in public libraries globally. Thereby promoting a healthy learning culture for us that is present and for future generations.

About the Author:

Ayebakuro Ngonamondi is an IT professional with over eight years of work experience. He has a BSc in Management and an MSc in Information Technology Management which he just concluded. During his master's program, he did a capstone project on Operationalizing AI for the Indiana Wesleyan University Online Campus Library Services (OCLS)

SE Michigan Section

What the Southeastern Michigan Section is looking forward to, in the next few months:

By Sharan Kalwani

- ✓ We are now more into summer and despite the ups and downs of our local weather, we remain active, with events happening all the time. When we review the last 5 months of 2024, we have done a total of 94 technical events (as compared to 34 back in early March 2024, See the R4 Q1 newsletter).
- ✓ We recently hosted many more Distinguished Speakers – this past month the topics were on *Cubic Boron Arsenide – a promising semiconductors for next generation electronics* and *Unconventional Computing using Spintronics*. Let me know if you wish for a copy.
- ✓ As mentioned back in March, we are now almost done with finalizing a 140-year celebration of the IEEE. This will take place on September 21, 2024.
- ✓ AVS Michigan Symposium @Wayne State Univ, Detroit w/ sponsorship from R4 among others
- ✓ The newly formed Magnetics Chapter kick off their seminar series as well as their Global Microwave Magnetics conference at Oakland University, Rochester, Michigan
- ✓ June Distinguished Speaker, Topic: *Why AI cannot with help software failures*
- ✓ Several highly acclaimed documentaries (with a few new ones too!), we have done over 40 since we started this initiative, not including repeats, due to popular demand….

You can find ALL of our upcoming events using the short URL link: **https://bit.ly/sem-upcoming**

In Memoriam

Bernie Sander

It is with deepest sympathy we share the passing of Bernie Sander. He was with his wife and passed away peacefully on May 7th. He had been struggling to come back from a fall and recent surgery. His obituary can be found here.

A life-long learner and problem solver, he often remarked how lucky he was to have work that he enjoyed! Long before gender equality became vogue, Bernie was involved in promoting the roles of women in his male-dominated world of engineering. In retirement he turned his attention to volunteer work with IEEE, serving with the Board and on many committees. He served as our Region 4 Director in 2017-2018 and was a proud HKN member. A recent commitment had been with the SKPL (Science Kits for Public Libraries) program which is designed to help children experience science as fun and challenging. His family has requested that any donations go to the SKPL program to continue to provide science kits for children. Donations can be made here.

Here is the link to Bernie's obituary.
https://www.dignitymemorial.com/obituaries/indianapolis-in/bernard-sander-11807102

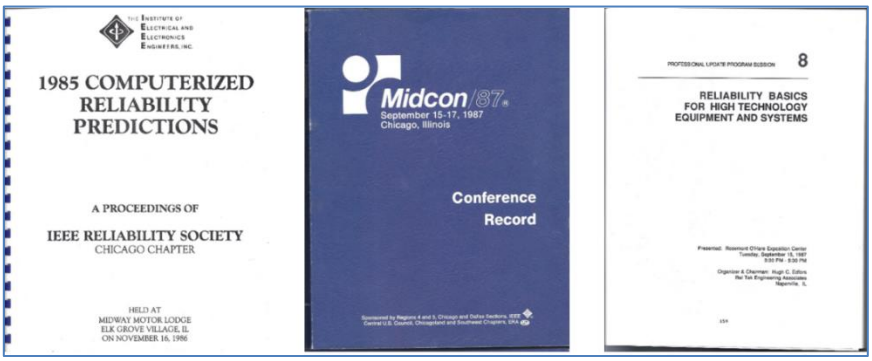
The family selected the Science Kits for Public Library Fund of the IEEE Foundation to receive donations. He was a strong supporter of the IEEE, the Life Members, and the Life Members Conference. As a matter of fact, he rarely missed a leadership meeting. He was a longtime leader within Region 4 and held numerous positions within the Region and in IEEE.

Hubert C. "Hugh" Edfors

Hubert C. "Hugh" Edfors died on 11 April 2024 in his home in Naperville, IL. He was a Chicago Section IEEE Senior Member, and Life Member.

In the 1980's he taught the Certified Reliability Engineer Review Course at the Chicago ASQ Training Institute, and MIL-217 prediction seminars on Saturday morning for the Chicago Section of the IEEE Reliability Society.For the Reliability Chapter, he served various roles of Chairman, Program Chair, Treasurer and Secretary through the years 1986 – 1996.

He was the Program Chairman for the successful "1985 Computerized Reliability Predictions" seminar held in Elk Grove Village, IL. In 1987 Hugh organized, chaired and participated in Session 8 on "Reliability Basics for High Technology Equipment and Systems", a group of six presentations, at the Midcon/87 Conference in Chicago, IL. Hugh founded his own consulting firm, Rel-Tek Engineering Associates. Hugh remained active in IEEE, participating in the Fox



Valley Sub Section of the Chicago Section.

This links to a public obituary for Hugh.

Don Bramlett

It is with a heavy heart and great sadness that we are sharing news about the passing of one of our longest serving IEEE members – Don Bramlett. Many of you knew Don from all these years of service to our Section, as well as his keenness for the Future City & Science Fair Competition.

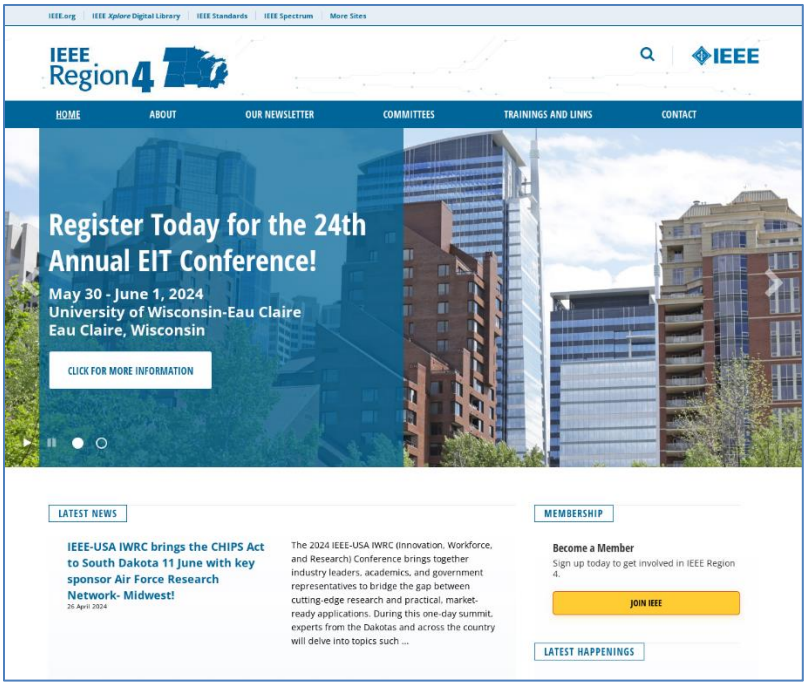
Don Bramlett received his BSEE and MBA from the University of Detroit. He was a registered Professional Engineer. Don spent his entire 40-year professional engineering career in the energy industry, 6 years in the natural gas industry, and then 34 years in the power generation segment of the electric utility industry. He retired as a Senior Project Engineer from DTE Electric, a major subsidiary of DTE Energy, where he had overall engineering responsibility for large capital projects at various power plants.

Don was an active volunteer with IEEE, at the Region and Section levels, the Engineering Society of Detroit (ESD), and the Michigan Society of Professional Engineers (MSPE). He was a Fellow of ESD and MSPE. He was also involved as a leader at the troop and district level with the Boy Scouts of America, and a member of the Board of Trustees of his church.

Region 4 Website Update

IEEE Region 4 Unveils New Website: A Modern Hub for Members

By Zach Wilson



IEEE Region 4 (R4) is excited to announce the launch of its brand-new website, designed to enhance the online experience for members and visitors. The modern interface, developed by Zach Wilson, our new IEEE R4 Communications Committee Chair and Webmaster, represents a significant step forward in the region's digital presence.

The new website features a visually appealing homepage, an informative "About" page, and an overall improved user experience. Visitors can expect easier navigation, streamlined access to resources, and a design that reflects the organization's values and mission.

We invite you to explore the new website and experience the difference.

https://r4.ieee.org/

We Value Your Feedback!

Your feedback played an instrumental role in shaping the final design of our new website. We encourage you to share any thoughts or comments you may have about the site with Zach Wilson at zachwilson@ieee.org.

Thank you for your continued support of IEEE Region 4! We hope you enjoy the new website and find it a valuable resource for your Region 4 activities.

About R4 Social Media

CrossWord Puzzle Answer

R4 Media Sites

Region 4 Website
https://r4.ieee.org/

Each of the sites below may be accessed through the Website:

R4 Event Calendar
https://r4.ieee.org/events/month/

R4 Facebook Page
https://www.facebook.com/R4.IEEE/

R4 LinkedIn Page
https://www.linkedin.com/company/ieeer4/

R4 Twitter
https://twitter.com/IEEER4

R4 Instagram
https://www.instagram.com/ieeer4/

R4 YouTube Channel
https://www.youtube.com/@IEEER4

R4 Newsletter:
https://r4.ieee.org/our-newsletter/

R4 Committee Members:
https://r4.ieee.org/committees/