January 2022

Welcome Message from Editor and Team!

Welcome to Winter 2022!

We welcome you to January issue of IEEE Newsletter, Toronto section.

In this issue, enjoy reading article "Managing 5G Edge Deployments with Closed Loop Automation". **(Page 4)**

Meet Inmar Givoni in our IEEE supporters section. Enjoy and appreciate her contributions to IEEE. **(Page 2)**

You can find newsletter's previous issues here. You can explore our Library to access links to various newsletters, resources, and chapter activities

By launching this newsletter, we intend to cover IEEE achievements and success stories specific to the Toronto area.

If you have any questions, suggestions, or concerns, please address them to the editor; Fatima Hussain at fatima.hussain@ryerson.ca. We hope to hear from you, and we welcome your feedback!

Editor's Note

Happy New Year!

Warmest thoughts and best wishes for a Happy New Year! May this new year bring us lots of new and exciting opportunities in our lives, with peace, love, and prosperity. Let's welcome the year-2022 hoping that the new year is safe and better than the previous, full of happiness and joy. We start this as a new chapter of our lives, lets do everything possible to make the upcoming year better, both personally and professionally. Although the last couple of years

have been challenging for all of us, this is the best time to regroup ourselves, rearrange our hopes, goals, missions, and work even harder towards them.

Meet Our Distinguished IEEE Supporters

Inmar Givoni

For the time being, I am still involved in a variety of professional activities such as mentoring new ventures, supporting women in tech, sitting on advisory boards, AI consulting, and organizing events for the tech community.

I also still give presentations about machine learning, algorithms, big data, and their applications to high-school kids, university students, researchers, and non-technical audiences. I also participate in various career panels and career mentoring events.

I'm particularly interested in outreach activities for young women, encouraging them to choose technical career paths. For my volunteering and mentoring work I received the University of Toronto's 2017 Arbor Award, and was recognized as one of the 2018 inaugural cohort of 50 inspiring Canadian women in STEM. I was recognized as one of Canada's Tech Titans: Top 19 of 2019, featured as one of Women in AI to Watch on Forbes in 2020, and am featured on the 2021 "See It Be It Stem It" calendar.

I like helping build communities, especially in Toronto. I am a co-organizer of the ML Ensemble and Canadian Tech@Scale conferences and am a long-standing contributor to CanCwic –the Canadian Celebration of Women in Computing, and WiML–Women in Machine Learning.

Previously, I was a director of engineering at Uber ATG Toronto. I built and led a team of research engineers working on bringing from research and into production cutting-edge deep-learning models for self-driving vehicles.

Before Uber, I oversaw all machine learning and software development efforts at Kindred, an AI & Robotics startup focusing on autonomous grasping for warehouse automation.

Prior to that, I was at Kobo's Big Data team, which I joined as a senior research scientist working on content analysis and website optimization, and was later the VP of Big Data, leading the team in the development and productization of algorithms for recommendations, search optimization, data science and analytics, content analysis and website optimization.

Before that, I was a member of technical staff at Altera (now Intel). I worked on optimization algorithms for FPGA packing and placement problems, as well as logic utilization estimation and reporting.

I obtained my Ph.D. in computer science at the University of Toronto, specializing in Machine Learning. I worked under the supervision of Professor Brendan Frey at the PSI lab. During my studies, I collaborated with the Boone Lab at the University of Toronto. I spent a term as a visitor of the CBL lab at the University of Cambridge, and interned with Microsoft Research. My first internship was with Search Labs where I worked on e-commerce search. My second internship was with the Machine Learning and Perception lab at MSR Cambridge, working on project Kinect.

I received my undergraduate degree in Computer Science and Computational Biology from the Hebrew University in Jerusalem. Back then I thought I'll be a neuroscientist when I grew up, and during my studies, I spent a summer at the Weizmann Institute studying the rat's visual cortex at Ilan Lampl's lab, and studied octopuses (octopii?) motor control with Benny Hochner's group. To this day, I remain a staunch octopus lover (not as food).


Managing 5G Edge Deployments with Closed Loop Automation

Utpal Mangla: VP & Senior Partner; Telco, Media, Entertainment Industry, IBM

Mathews Thomas: Distinguished Engineer; Telco, Media, Entertainment Industry, IBM

5G with edge computing is an emerging area which will revolutionize and transform various industries. The rapidly increasing number of edge nodes, management of sophisticated workloads running AI, variability of edge nodes, distribution of content at the edge and security implications provides challenges to creating end-to-end solutions. The diagram below provides an overview of the edge ecosystem.
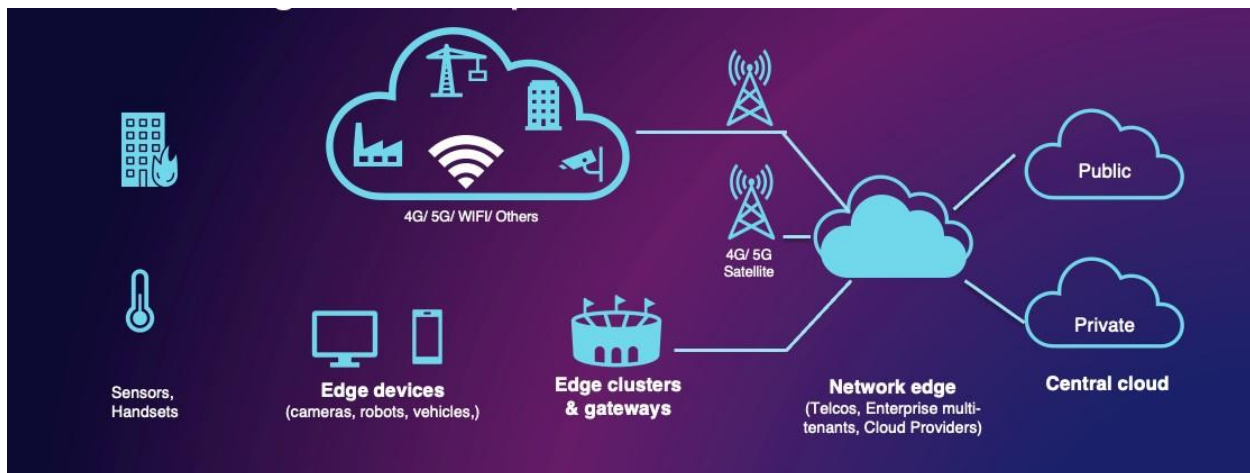

5G and Edge Landscape

Some key components that form the edge ecosystem are the following:

- Cloud: This could be a public or private cloud, which can be a repository for the media container-based workloads including applications and machine learning models.

- Network Edge: This is generally part of the Communication Service Providers (CSP) core network which can host larger edge applications and data.

- Edge cluster/gateway: An edge cluster/gateway is a multi-edge compute node that is in a remote operations facility such as a factory, retail store, hotel, distribution center, or bank.

- Edge device: An edge device is a special-purpose piece of equipment that also has compute capacity integrated into the d

Troubleshooting, root-cause analysis and management of such a landscape is complex especially given the number of nodes involved. The explosion of data available and the need to automate the process with minimal human intervention.

Closed-loop automation systems enable companies to transform network and IT operations by using AI-driven automation to detect anomalies, determine resolution, and implement the required changes within a continuous highly automated framework. Closed-loop automation helps solve many problems before they even become issues in a 5G Edge environment and many CSP's are beginning to integrate it into their 5G Edge deployment.

There are different types of closed loop systems. A simple closed-loop implementation detects issues that could happen in the future. The appropriate data is analyzed by various predictive models, which then make a recommendation on the change to be made to the orchestration layer, which implements the change. In complex cases, closed-loop automation combines the predictive insights information with additional AI systems to determine a resolution which is then implemented by a Robotic Process Automation (RPA) system. The following diagram provides an overview of a closed-loop automation system that addresses issues of varying complexity.
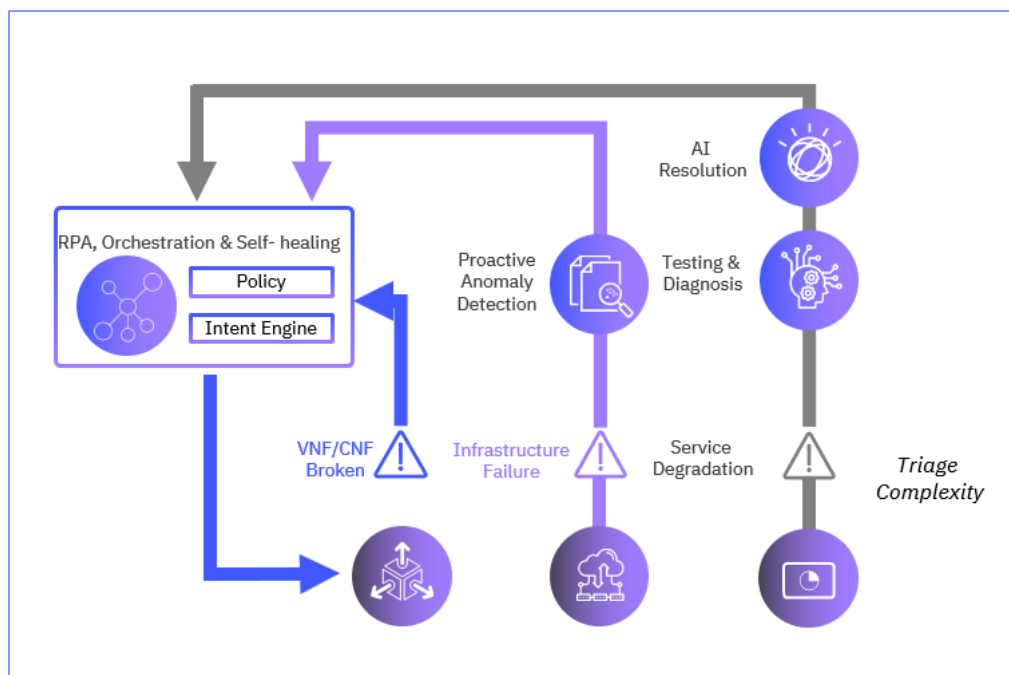
Closed-loop automation ensure 5G Edge implementations function properly with minimal human interventions. Data is collected from the different edge nodes and anomalies are detected. The data usually consists of large, real-time, time-series data to analyze networks applications, database metrics, operating systems, etc. This gives anomaly detection the capability to identify patterns and raise awareness towards appropriate actions. Machine learning models are used create the patterns for the series of alerts so that those can be bound to causes and known actions, and then be corrected accordingly. The machine learning algorithms also predict how application and network behaviors are dependent on seasonality and other factors to ensure that appropriate corrective actions are taken, thereby permitting systems to perform optimal. It makes use of various AI algorithms to ensure the accuracy of root-cause identifications and implements the required remediation steps. The remediation includes invoking an RPA system which is integrated with an AI system which has been trained to resolve the identified anomaly. If the AI system determines it has a high confidence that the planned resolution is correct, the RPA will invoke a system such as an orchestration engine to implement the solution automatically. If not, a trouble ticket is generated, and an engineer works to resolve the issue.

In summary, edge computing built on 5G will soon be mainstream in solutions across many industries. It is, however, a very complex environment to manage given the many systems involved and the need to automate the management of the environment as much as possible. Close Loop Automation built on AI is an important step to address this issue and is being adopted by service providers, IT companies and research organizations to address this issue.

About the Authors

Utpal Mangla (MBA, PEng, CMC, ITCP, PMP, ITIL, CSM) is a Vice President and Senior Partner in IBM. He is the Global Leader of IBM's Telecommunications, Media and Entertainment (TME) Industry's Center of Competency. In addition, he leads the 'Innovation Competency' focusing on AI, 5G EDGE, Hybrid Cloud and Blockchain

Innovations for TME clients worldwide. In his role as senior executive in the business and thought leader in emerging technologies, Utpal's mission is to fuel growth by building, selling and implementing differentiated competitive market service solution offerings to meeting critical business imperatives of our customers.

Mathews Thomas is a Distinguished Engineer at IBM's Telecom and Media labs. With 20+ years in consulting, system integration and industry experience working with many of the major Telecom and Media companies, Mathews brings in-depth expertise and knowledge in defining, building and running strategic IT projects. He works with clients, partners, and standards organizations to develop innovative solutions built on IBM's AI, analytics, blockchain and cloud platforms with current focus on 5G and edge computing. He holds over 50 patents, has over 40 publications and has presented at over 50 conferences in above areas.

Get Involved with Us!

IEEE Toronto section is looking forward to hearing from you. your contributions are welcome to this monthly newsletter. We invite our members to share and submit:

- Short Story (about IEEE members, WIE members)
- News items and Affinity group reports
- Technical Articles/Blogs (Brief discussions of cutting edge research, new technological tools, topics of your choice)

Submission

Articles should be submitted in Word format. Word count for News items, Affinity group reports is 50 to 200 words and for blogs/ articles is 500 to 800 words.

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