IEEE New Zealand Central Section Report
February 2023

A.1 Executive Summary

- **Section Executive Committee Member List in 2022**
    - Chair: Yi Mei
    - Vice Chair: Chanjief Chandrakumar
    - Immediate Past Chair: Murray Milner
    - Secretary: Murray Milner
    - Treasurer: Donald Bailey
    - Membership Development: Qi Chen
    - Webmaster: Jordan MacLachlan, Joao Costa
    - (Joint) Education Coordinator: Nurul Sarkar
    - Professional Activities Coordinator: Fangfang Zhang
    - Industry Coordinator: Sanjib Mishra
    - Young Professionals: Bach Nguyen, Andrew Lensen, Fangfang Zhang
    - Women in Engineering: Kanwal Zaidi, Bing Xue, Qi Chen, Fangfang Zhang
    - Life Member Coordinator: Murray Milner
    - Victoria Student Branch Chair: Kun Huang
    - Massey Student Branch Chair: Yuan Chang
    - Student Counsellor: Mengjie Zhang, Donald Bailey
    - Central CI Chapter Chair: Mengjie Zhang
    - Central Power and Energy Chapter Chair: Ramesh Rayudu
    - NZ Joint SP/IT Chapter Chair: Yusuke Hioka
    - NZ Joint Communications Chapter Chair: Andrew Austin
    - NZ Joint I&M Chapter Chair: Andrew Taberner
    - NZ Joint Robotics and Automation Chapter Chair: Ho Seok Ahn
    - Xiang Gui
    - Fanglue Zhang
    - Alex Doronin

- **Section Highlights**
    - Despite the continuous challenges caused by COVID-19, the New Zealand Central Section still had another successful year in 2022. We managed to organise many events (in-person or virtual) for members across many areas of interest. Many of these events involved Distinguished Lecturers from around the world. It is these activities which members find most interesting and enable us all to keep at the forefront of research within our fields of interest.
    - Our Section performed well in terms of both quantity and quality of the organised activities and received an IEEE R10 Outstanding Small Section Award 2022.
    - In 2022, we continue to successfully hold our two most prestigious events, being the Postgraduate Symposium and the Combined Institutions Breakfast Event. The first of these events is primarily focused on our student members, while the latter is focused on our industry collaboration. These events were again well received by members. More details on these events are provided below.
    - Our Section nominated and supported a new NZ joint Society Chapter on Geoscience and Remote Sensing in 2022, which has been successfully formed now.
    - The Section Chair Yi Mei and Secretary Murray Milner met the 2023-2024 R10 Director Lance Fung in Wellington during his visit on the 28th December 2022. We have updated to Lance about the current state of the Section and our current challenges (especially retaining membership after students graduate, and the competition with the local Engineering New

Zealand). Lance has known much more details about our Section, and this meeting will potentially help our Section to be better supported by R10.

- **Major Events (International, National)**
  - o 31 August 2022: The Postgraduate Symposium was held at Victoria University of Wellington. The event was very successful with 42 attendees, most of which are IEEE (student) members from Victoria University of Wellington and Massey University (Palmerston North). 30+ students gave presentations about their research, and everyone had very good networking. The cost of this event was around $1200NZD, including the catering, gifts, and presentation awards.
  - o 1 September 2022: The Section organised the Joint Institutions Breakfast event, together with EngNZ and IET. This was held as an in-person event at the Wellesley Boutique Hotel (our usual venue). The event had 30+ people in attendance from IEEE, EngNZ, IET and outside. We invited Sir Neville Jordan to give a presentation on "Snakes and Ladders". Sir Neville Jordan is a Distinguished Fellow of Engineering New Zealand and was awarded the UK IET Kirby Medal for outstanding eminence and distinction in advanced technology. He co-founded over 30 science/tech startup companies including his microwave telecommunications company that achieved a successful IPO on the NASDAQ Main Board. He has received the Governor General's Supreme award for Exporting and inducted into both the NZ Hi-Tech Hall of Fame and the Business Hall of Fame. The presentation went very well. Sir Neville Jordan discussed about a perspective from an engineer who went from baking to nuclear engineering and electronics and got into drugs along the way. This was followed by a Q&A session. There was a very high engagement throughout the event. The cost for this event is distributed between the attendees and each of the three participating Institutions which resulted in a cost of under $300NZD for IEEE NZCS. This is an excellent event for sharing between institutions and for engagement with industry.
  - o 23 September 2022: The Computational Intelligence Society (CIS) Chapter hosted a Seminar by Prof. Carlos A. Coello Coello on 23th September 2022. Prof Coello Coello is a Professor with Distinction (CINVESTAV-3F Researcher), Computer Science Department, CINVESTAV-IPN, Mexico City, Mexico. He is the Editor-in-Chief of IEEE Transactions on Evolutionary Computation (the top journal in our research field) and an IEEE Fellow. He gave a talk on "Lessons Learned after 25 Years Designing Multi-Objective Evolutionary Algorithms". 46 IEEE members attended the seminar and had really good discussions.

- **Major Chapter Activities**
  - o <u>IEEE NZ Central Computational Intelligence Society Chapter</u>
    - 14 January 2022: This is the first of our Chapter Series technical seminars. Dr Yi Mei delivered an overview on interpretable Artificial Intelligence (XAI) with a focus on interpretable genetic programming for AI. A lot of discussions were held.
    - 21 January 2022: We organised a technical seminar by Dr. Aaron Chen, which provided an introduction on reinforcement learning, including representations, objective/cost functions, paradigms on RL. Many discussions were made.
    - 28 January 2022: We organised a technical seminar by Prof. Bing Xue, which provided an overview on deep learning for image classification including different types of deep neural networks and non-neural network based deep learning for image classification. History of deep learning was also discussed and debated.
    - 4 February 2022: We organised a technical seminar by Dr. Ying Bi, which overviewed recent work of genetic programming for image classification, based on Ying's recent book published by Springer. This ranges from program representatio and structure, search techniques, fitness evaluations, and the use of machine learning techniques in/for genetic programming for image classification.
    - 11 February 2022: We invited Terence Hikawai to give a seminar, which provided an overview on how Maori data and VM can and should be considered in our research, particularly in data science and artificial intelligence. This is important topic in NZ research, and the staff and research students in our Chapter learn a lot from the seminar and discussions.
    - 25 February 2022: We organised a seminar. Dr. Bach Hoai Nguyen provided an overview on the most recent techniques on evolutionary computation for feature reduction. Applications, challenges, and future directions were provided and discussed.

- 4 March 2022: We organised a seminar by Dr. Fangfang Zhang, which overviewed the most recent works on genetic programming and machine learning techniques for job shop scheduling. Applications, challenges, and future directions were provided and discussed.
- 11 March 2022: We organised a seminar given by A/Prof. Hui Ma, which provided an overview of recent work on evolutionary computation techniques for web service composition, a combinatorial optimisation task. The main techniques include genetic programming, genetic algorithms, particle swarm optimisation and ant colony optimisation.
- 18 March 2022: We organised a technical talk given by Dr. Qi Chen, which provided an overview of her recent work on genetic programming for symbolic regression problems, particularly a specialised type of GP --- geometric semantic GP.
- 25 March 2022: We arranged a technical talk presented by Dr. Andrew Lensen, which introduces recent work on genetic programming, explanability and interdisciplinary AI. Examples on visualisation on clustering is presented and discussion.
- 8 April 2022: We organised a technical talk by Dr. Harith Al-Sahaf, which presents an overview of recent work on malware analysis with a focus on machine learning techniques. Basics and advanced techniques are presented, and challenges and future work are discussed.
- 22 April 2022: Prof. Mengjie Zhang gave a talk that discusses the requirements of first-year PhD students in the Faculty of Engineering on the full proposals. The rationale/motivations, goals/objectives, literature survey, preliminary work, proposal contributions, timeline and resource requirement were presented and discussed.
- 29 April 2022: Dr. Sharon Gao gave a talk that presents an overview of recent work on text mining and natural language processing, including both symbolic AI and computational intelligence techniques. In particular, recent deep learning techniques for text mining are discussed, and the use of evolutionary computation techniques was also presented.
- 27 May 2022: The Chapter invited Dr. Kevin Shedlock to give a seminar on "Te Pataka Purorohiko: An overview of the ECS Māori Digital Lab". It introduces some of the partnerships forming, work with iwi, modelling and social interface occurring as a way to intelligently engage mātauranga Maori within the hub.
- 8 July 2022: We organised a seminar that discusses a recent piece of work on solving multi-objective feature selection problems in Classification via problem reformulation and duplication handling. The representation, search techniques and results are presented and discussed.
- 22 July 2022: We organised a seminar that presents a machine learning task on stream data mining. Dr. Heitor Gomes presents his recent idea in this direction, including his resent Marsden project. Three main directions are discussed.
- 7 September 2022: The Chapter invited Professor Jinyan Li to give a seminar on "optimisation and machine learning problems in bioinformatics". The talk presents a chain encoding idea in a graph-based algorithm for compressing large scale Illumina DNA/RNA sequencing data. Then it introduces a k-mer lattice approach to the accurate rectification of miRNA sequencing errors. In the third part, it briefly talks about a very recent discovery of cell bifurcation patterns from COVID-19 single cell RNA-sequencing data sets. In addition, it also raises some performance-oriented optimization and deep learning questions for discussion and for potential research collaborations. Over 50 people attended the seminar and made good discussions.
- 23 September 2022: The Chapter invited the IEEE Distinguished Lecturer and IEEE Transactions on Evolutionary Computation Editor-in-Chief, Prof. Carlos A. Coello Coello, to give a presentation discussing the Lessons Learned after 25 Years Designing Multi-Objective Evolutionary Algorithms. Over 50 people attended the seminar and a lot of discussions have been made.
- 28 October 2022: We organised a seminar that presents a number of techniques and skills on the use of genetic programming and provided a series of guidelines. This includes the use of linear scaling in the fitness functions for symbolic regression and other tasks, the evaluation criteria on the R^2 measures of different kinds. A lot of discussions were made.

- 25 November 2022: We organised a seminar that forms a big discussion on genetic programming --- history, paradigms, learning vs optimisation, challenges, applications, and future directions. Prof Wolfgang Banzhaf uses his over 30 years of experience on genetic programming to discuss many ideas with the members in the Chapter and non-member students in the School. This is a great experience to host big names in EC and GP.
- 16 December 2022: The final event of the CIS Chapter on 16 Dec 2022 is to Celebrate the awards of Engineering NZ Fellows to the CIS key members. Prof Bing Xue and A/Prof Yi Mei from the CIS Chapter at the NZ Central Section were successfully awarded a Fellowship by Engineering New Zealand. This is a great achievement for our Chapter and also a good recognition of ICT engineering and AI/CI/EC discipines in NZ. Prof Bing Xue and A/Prof Yi Mei spoke for their main achievements and experience on the applications.
- IEEE Joint NZ Communications Society Chapter
    - 31 January 2022: 2022 IEEE PreU STEM Event: IEEE STEM Ambassador A/Professor Nurul Sarkar met college students and parents in Waterview Park (Auckland, New Zealand) to have a mentoring session. The event was held on Monday 31st January 2022. The discussion began with a light lunch and finished with Soccer play. We had seven senior college students (mostly Year 11 and 12) and five parents. We talked about the IEEE STEM program and asked each student about their future career in turn. It is interesting to note that some students are keen to study Engineering and Technology after completing high school. Parents are also happy to see their childrens' Engineering career direction. Finally, we talked about sporting interests and played soccer (students versus parents). Both students and parents enjoyed the event.
    - 14 June 2022: Associate Professor Nurul Sarkar was invited to St Cuthbert's College Auckland New Zrealand to give a speech for a joint career event attended by 50+ year thirteen students accompanied by their parents. The lecture began with a short video presentation highlighting the importance of STEM education in tertiary institutions specially at Auckland University of Technology. The scope and the various study options including BCIS and Engineering programs were discussed. As part of pre-Uni STEM outreach activities we extend our discussion to include Women in Technology and the Institute of Electrical and Electronics Engineers (IEEE) Women in Engineering and the opportunity for joining IEEE professional activities and student membership. The wealth of IEEE STEM resources for students were highlighted. The feedback from participants indicate that the event was successful.
    - 11 July 2022: Being a Program Director and STEM Champion Associate Professor Nurul Sarkar gave a speech addressing new students joining Semester 2 at Auckland University of Technology (AUT). About 60+ 1st year students attended the lecture. The lecture began with a short video presentation highlighting the importance of STEM education and student learning opportunity at AUT. The scope and the various study options within the Bachelor of Computer and Information Sciences (BCIS) programs were discussed. We extend our discussion to include Women in Technology and the Institute of Electrical and Electronics Engineers (IEEE) Women in Engineering and IEEE student branches on campus. The IEEE STEM resources for students were highlighted. We had positive responses/feedback from participants indicate that the event was successful.
    - 21 August 2022: One of the largest and most significant pre-Uni outreach programmes was held on the 21st of August 2022 at Auckland University of Technology where we volunteered for the day. We met and greeted about 2000+ Y13 high school students and their parents on-campus. We had demonstrations and showcases on emerging network technologies (Wi-Fi, Bluetooth), practical live projects on wireless sensor networks, robotics, machine learning, and image processing. In addition to the greater Auckland region, students also came from Hamilton and Wellington. Being a programme director (BCIS), A/Prof. Nurul Sarkar had the opportunity to talk with students and their parents regarding study plans and career opportunities.
    - 13 October 2022: AUT's Engineering, Computer and Mathematical Sciences hosted a four-day (Oct 12 to 15) STEM Camp for Year 13 Māori secondary school students.

Students have had an opportunity to learn and observe what a tertiary study pathway in science, technology, engineering, and mathematics looks like at AUT. On 13 October, A/Professor Minh Nguyen (HoD, Computer Science and Software Engineering) and A/Professor Nurul Sarkar (BCIS Programme Director) offered a workshop covering practical applications of Computer Science and Technology, including artificial intelligence, image processing, networking, software development, and data science. The session was concluded through a live demonstration of Bluetooth network modelling. About 20 students attended the workshop with a positive outcome. This was an excellent event for encouraging Maori students to join IEEE.

- 30 October 2022: MOTAT STEM Fair is one of the largest annual STEM events held on the 30th of October 2022 at MOTAT in Auckland where we volunteered for the day. We met and greeted more than 400 school kids (ages 7 to 14 years) and their parents at the MOTAT centre, Auckland. We had demonstrations and showcases on Engineering, Mathematics, and Computer Sciences practical problems, live demonstrations, and hands-on project trials. I had the opportunity to talk many students and their parents about technologies such a Blutooth network modelling.

- IEEE Joint NZ Signal Process / Information Theory Society Chapter
  - 2 June 2022: The Chapter organised a seminar including two talks. The first one is "Ultrasonic Arrays for Pasture Biomass Estimation and Grape Occlusion Detection" by Dr Mathew Legg / Baden Parr, and the second one is "Detecting and Counting Sheep in UAV Videos" by Farah Sarwar.
  - 30 September 2022: The Chapter organised a seminar given by Nick Eng on speech enhancement. Speech enhancement, or the removal of noise and reverberation from noisy speech, has been a heavily researched area for the last few decades. Recently, deep learning has shown great success in the speech enhancement domain, however much research can still be undertaken to further improve deep learning methods. One such approach is finding alternative loss functions to train the speech enhancement models. This talk discusses the use of perceptual quality features that correlate with human perception in the loss function to improve the quality of speech processed by speech enhancement.
  - 7 December 2022: The Chapter organised two seminars. The first is titled "Signal-processing-inspired deep learning for audio source separation" (T. Nakamura) and the second is titled "Towards human-in-the-loop DNN-based speech synthesis technologies" (Y. Saito).

- IEEE Joint NZ Robotics and Automation Society Chapter
  - 26 August 2022: 2022 IEEE NZN R&A Section Seminar 3 with Dr. Inkyu Sa of CSIRO about agricultural robot system.
  - 11 October 2022: 2022 IEEE NZN R&A SECTION SEMINAR 4: Robots for milk cows, by CEO, Dawoon, Korea
  - 4 November 2022: 2022 IEEE NZN R&A SECTION SEMINAR 5 with Dr Trevor Gee. AR for Robotics

- **Major Student and Affinity Group Activities**
  - 27 June 2022: The Victoria University of Wellington Student Branch organised an IEEE Postgraduate Networking event. Students from both under- and post-graduate levels learned from Section leaders a high-level overview of IEEE, the Section, and Victoria's current academic pathways, research projects and scholarship opportunities.
  - 20 July 2022: The Victoria University of Wellington Student Branch co-organised and attended the Workshop "Writing: Conciseness and Clarity" given by A/Prof. Peter Andreae from Victoria University of Wellington. A/Prof Peter Andreae discussed useful tips to write concisely and clearly so that it is easier for readers to understand. The presentation went through fixing a list of writing examples. Free pizza was provided for attendees to encourage networking.
  - 9 August 2022: The Victoria University of Wellington Student Branch attended the inaugural lecture given by Prof. Bing Xue at the Hunter Council Chambers on August 9. During this event, Bing discussed not only her career, but aspects of her personal life that have enabled her to achieve as highly as she has.
  - 31 August 2022: The Victoria University of Wellington Student Branch and Massey University Student Branch organised the IEEE Postgraduate Symposium 2022, which was held at Victoria University of Wellington in Kelburn, Wellington. This event involved presentations from 30

PhD students from Victoria University of Wellington and Massey University (Palmerston North) to present their research work. In addition, there were approximately 40 fellow students who enjoyed the presentations. The three best presentations were recognised and awarded with prizes.

- **Awards**
  - The Section Received an IEEE R10 Outstanding Small Section Award 2022.
  - Our CIS Chapter received $275USD from IEEE Computational Intelligence Society in 2022 as a reward to the large number of activities held in 2021.

A.2 Financial Report

- **Summary (balances as of 31 December 2022)**

Local account	NZ$ 10,825.38
NextGen banking	US$ 13,253.18

- **Income and expenditure are summarized for 2022** as follows:

Income (Local account)

CI Chapter awards (US$500)	NZ$ 848.18	
AGM dinner registration (via banking)	NZ$ 220.00	
Interest	NZ$ 27.12	
Total income		NZ$ 1095.30

Expenditure (Local account)

Bank charges	NZ$ 5.13	
Student member grants (20)	NZ$ 838.28	
PG Writing workshop	NZ$ 398.97	
PG Networking event	NZ$ 839.98	
PG Symposium	NZ$ 1,232.75	
Joint Institutions breakfast event	NZ$ 258.33	
CIS DL Talk (Prof Coello Coello)	NZ$ 500.00	
IET Dark Sky dinner	NZ$ 90.75	
AGM Dinner venue and catering	NZ$ 1,390.00	
PG/YP Writing workshop	NZ$ 363.27	
Total expenditure		NZ$ 5,917.46
Net expenditure (local account)		NZ$ 4,822.16
Converted to US$:		US$ 3,042.54

Income (NextGen)

MGA Section Rebate	US$ 3,427.25	
R10 Outstanding Small Section Award	US$ 1,000.00	
Interest	US$ 71.90	
Net Income (NextGen)		US$ 4,499.15

Overall income	US$ 1,456.61

PART B - ORGANIZATIONAL ACTIVITIES

B.1 Membership Development Activities

- Total number of active members in the past 3 years.
  - 2020: 266
  - 2021: 271
  - 2022: 276

- Summary and evidence of work done to improve the value of membership, which leads to retention and growth of members.
    o In 2022, we have emailed to remind members within the Section who are late to renew their membership for the new year about the benefit of being IEEE member and continue to be a part of the group.
    o We have had an active program of section activities, particularly focused on Chapter activities to encourage more participation by members with specialist interests.
    o We have had a strong program within Victoria University of Wellington and Massey University associated with the section, particularly with postgraduate students. This is reflected in the strong participation with the joint Postgraduate Symposium, which is a whole day event.

B.2 Chapter Activities

- Total number of Chapters in the Section: 6 (Six)
    o Chapter of the Computational Intelligence Society
    o Chapter of the Power and Energy Society
    o Joint Chapter of the IEEE Communications Society (joint with NZ North and NZ South)
    o Joint Chapter of the IEEE Instrumentation and Measurement Society (joint with NZ North and NZ South)
    o Joint Chapter of the Signal Processing and Information Technology Societies (joint with NZ North and NZ South)
    o Joint Chapter of the IEEE Geoscience and Remote Sensing Society Chapter (joint with NZ North and NZ South)
- Number of Chapters formed in the current year: 1 (One)
    o Joint Chapter of the IEEE Geoscience and Remote Sensing Society Chapter (joint with NZ North and NZ South)
- Number of active Chapters (Chapters who have reported required number of meetings during the year)
    o Four
- Summary of Chapter activities (Chapter wise with attachment table/information)
    o See above

B.3 Professional and Continuing Education Activities

We have a NZ nationwide Education Coordinator (Nurul Sarkar) nominated by NZ Central Section, who is also an IEEE STEM Ambassador. Our Education Coordinator has organised a number of education activities as follows:
- AUT's Engineering, Computer and Mathematical Sciences hosted a four-day (Oct 12 to 15) STEM Camp for Year 13 Māori secondary school students. Students have had an opportunity to learn and observe what a tertiary study pathway in science, technology, engineering, andool mathematics looks like at AUT. On 13 October, A/Professor Minh Nguyen (HoD, Computer Science and Software Engineering) and A/Professor Nurul Sarkar (BCIS Programme Director) offered a workshop covering practical applications of Computer Science and Technology, including artificial intelligence, image processing, networking, software development, and data science. The session was concluded through a live demonstration of Bluetooth network modelling. About 20 students attended the workshop with a positive outcome. This was an excellent event for encouraging Maori students to join IEEE.
- One of the largest and most significant pre-Uni outreach programmes was held on the 21st of August 2022 at Auckland University of Technology where we volunteered for the day. We met and greeted about 2000+ Y13 high school students and their parents on-campus. We had demonstrations and showcases on emerging network technologies (Wi-Fi, Bluetooth), practical live projects on wireless sensor networks, robotics, machine learning, and image processing. In addition to the greater Auckland region, students also came from Hamilton and Wellington. Being a programme director (BCIS), I had the opportunity to talk with students and their parents regarding study plans and career opportunities.
- On 11 July 2022, being a Program Director and STEM Champion Associate Professor Nurul Sarkar gave a speech addressing new students joining Semester 2 at Auckland University of Technology (AUT). About 60+ 1st year students attended the lecture. The lecture began with a short video presentation highlighting the importance of STEM education and student learning opportunity at AUT. The scope and the various study options within the Bachelor of Computer and Information Sciences

(BCIS) programs were discussed. We extend our discussion to include Women in Technology and the Institute of Electrical and Electronics Engineers (IEEE) Women in Engineering and IEEE student branches on campus. The IEEE STEM resources for students were highlighted. We had positive responses/feedback from participants indicate that the event was successful. Over 60 people attended the orientation.

- On 14 June 2022, Associate Professor Nurul Sarkar was invited to St Cuthbert's College Auckland New Zealand to give a speech for a joint career event attended by 50+ year thirteen students accompanied by their parents. The lecture began with a short video presentation highlighting the importance of STEM education in tertiary institutions specially at Auckland University of Technology. The scope and the various study options including BCIS and Engineering programs were discussed. As part of pre-Uni STEM outreach activities, we extend our discussion to include Women in Technology and the Institute of Electrical and Electronics Engineers (IEEE) Women in Engineering and the opportunity for joining IEEE professional activities and student membership. The wealth of IEEE STEM resources for students were highlighted. The feedback from participants indicate that the event was successful.

- IEEE STEM Ambassador A/Professor Nurul Sarkar met 10+ college students and parents in Waterview Park (Auckland, New Zealand) to have a mentoring session. The event was held on Monday 31st January 2022. The discussion began with a light lunch and finished with Soccer play. We had seven senior college students (mostly Year 11 and 12) and five parents. We talked about the IEEE STEM program and asked each student about their future career in turn. It is interesting to note that some students are keen to study Engineering and Technology after completing high school. Parents are also happy to see their children's Engineering career direction. Finally, we talked about sporting interests and played soccer (students versus parents). Both students and parents enjoyed the event.

B.4 Students Activities

- Total number of Student Branches in the Section
  - Two – Massey University and Victoria University of Wellington
- Number of new Student Branches formed in the current year
  - None
- Section level student activities (student congress, paper and other contests, awards etc)
  - 31 August 2022: The IEEE Postgraduate Symposium was held at Victoria University of Wellington in Kelburn, Wellington. This event involved presentations from 30 PhD students from Victoria University of Wellington and Massey University (Palmerston North) to present their research work. In addition, there were approximately 40 fellow students who enjoyed the presentations. The three best presentations were recognised and awarded with prizes.
- Number of active Student Branches (Student Branches who have reported required number of meetings during the year)
  - Two
- Summary of Student Branch activities (Student Branch wise with attachment table/information)
  - As per above.

B.5 Affinity Group Activities

- **Young Professional (YP)**
  During 2022, the following events and activities have been organised:
  - The Group organised an in-person YP networking and seminar event "Writing: Conciseness and Clarity" on 20 July 2022. The event invited an Associate Professor (Peter Andreae) from Victoria University of Wellington to give a seminar on professional writing, followed by a pizza party. The event was very successful, with 46 attendees (44 are IEEE members). The cost was about $400NZD, fully supported by the Section.
  - Based on the very positive feedback, the Group organised the follow-up session of the Workshop "Writing: Conciseness and Clarity" on 9 November 2022. In the event, A/Prof. Peter Andreae continue to discuss how to write concisely and clarified, along with more examples. The event had 18 attendees (15 from IEEE). The cost was about $300NZD, fully supported by the Section.

- o The Group co-organised the Webinar "Mentor-Mentee Relationship Development" together with the WIE Affinity Groups of the New South Wales Section and NZ Central Section, on 18 August 2022.
  - o The Group provided support for the Victoria University of Wellington and Massey University Student Branches for the preparation of their Postgraduate Symposium on 31 August 2022. (see below).
  - o The Group provided support for the WIE Affinity Group on the event "Navigating Competitive Grant Application Processes" on 29 November 2022.
  - o The Group participated in the Joint Institutions Breakfast Seminar (see below).
- **Women In Engineering (WIE)**
  In 2022, the WIE group has undertaken the following activities:
  - o The Group co-organised the Joint WIE Webinar event on "Navigating Competitive Grant Application Processes", together with Australia New South Wales Section WIE Group. The event was held via zoom on 29 November 2022, with 29 attendees (25 from IEEE).
  - o The Group organised the WIE Webinar event "WIE Meet and Greet" for social network within the New Zealand Central Section on 31 May 2022.
  - o The Group co-organised the virtual event "Why Women in Engineering?" together with Australia New South Wales Section WIE Group. The event was held on 6 July 2022, with 19 attendees.
  - o The Group organised an event for establishing collaborations with Iqra University, IEEE Pakistan Section, and the industry partners. The event was held on 19 July 2022 with 4 attendees.
  - o The Group co-organised the virtual event "Mentor-Mentee Relationship Development" together with Australia New South Wales Section WIE Group. The event was on 18 August 2022, with 22 attendees.
  - o The Group provided support for the YP Affinity Group and participation in the seminar "Writing: Conciseness and Clarity".
  - o The Group provided support for the Victoria University of Wellington and Massey University Student Branches for the preparation of their Postgraduate Symposium (see below).
  - o The Group participated in the Joint Institutions Breakfast Seminar (see below).
- **Life Member (LM)**
  - o Our Life Member Affinity Group Coordinator, Murray Milner, has been actively communicating with the Life Members in the whole New Zealand and the Chairs of the other New Zealand Sections (North and South Sections) to form a nationwide LM Affinity Group. Given the small number of Life Members in NZ, it is more sensible to form a nationwide Affinity Group rather than each single section. We have made substantial progress in 2022, and now is at the final stage of processing the administrative steps of establishing the Affinity Group.

B.6 Awards & Recognition Activities

- **Award constituted by the Section**
  - o The key awards constituted by the Section are those in support of the Postgraduate Symposium.
  - o These awards for best presentation are presented each year at the Symposium.
- **Please list all Awards and Recognitions received by the Section, and members in the Section, from R10 and IEEE HQ during the year**
  - o R10 Outstanding Small Section Award 2022

B.7 Communication Activities (Newsletter, Home Page, E-mail etc.)

- Newsletter (name and number of issues in the year)
  - o Not Applicable
- Home Page of the Section (give the URL and how often it is updated)
  - o The Section website is updated regularly with activity information, both as announcements of upcoming events, and reports on the events as they happen. The URL is https://r10.ieee.org/nzc/.
  - o The website is kept regularly up to date by our very active webmasters Jordan MacLachlan and Joao Costa. They ensure that all activities involving the Section are recorded on the website in a timely manner and frequently chase committee members to ensure that reports on recent events are recorded quickly, with photos where possible.

- We have attended the R10 Website Competition in 2022. Although we didn't receive the award (there was no winner in the competition), it was a very good experience to receive feedback from R10 that might be helpful to further improve our website.
- Other means of contacts with Section members including social media
  - Members are notified of upcoming events through e-notices.

B.8 Industry Relations

- Membership growth and retention
  - Our Industry Coordinator Sanjib Mishra has proposed a three-year initiative to establish better relationship with NZ industry. We plan to discuss more about this in 2023 and start taking some initial actions such as looking for industrial collaborators to form small working groups.
  - Our Young Professional Coordinator, Bach Hoai Nguyen, has also established good relationship with the Engineering New Zealand YP Coordinator from previous YP events.
- Activities for/with industrial members
  Our Section has co-organised the following events together with Engineering NZ (ENZ) and/or Institution of Engineering & Technology (IET):
  - The seminar "LED Screens – Design and Specification" by Garth Reynolds on 17 August 2022. Garth Reynolds is the Branch Manager of ULA Group New Zealand. A subsidiary of ULA Group is Vuepix Infiled who is a market leader in commercial LED displays and signage technology. Garth has over 20 years' experience in the Audio Visual space from integration, distribution and manufacturing. There were 250+ attendees (12 from IEEE) for this seminar.
  - The IET presentation "BIM for lighting" by Michael Warwick on 21 July 2022. Michael Warwick is an independent sustainable lighting consultant and BIM manager with over twenty years of lighting design experience. In 2016 Michael set up his own independent lighting design studio, MAW Design, based in Wellington.
  - The presentation "My Pathway" by Prof. Bob Hodgson on 16 June 2022. Bob described how his life path from Schoolboy Electronics Enthusiast to Professional Engineer and Senior Engineering Educator has involved successions of projects of increasing complexity. Bob says "I just love doing projects! My schoolboy electronics hobby led me to a sandwich degree, that is, an engineering degree with thirty months of integrated industrial experience working in avionics in the UK Aircraft Industry. This included the avionics for several then state-of-the-art aircraft including the Concord, the Harrier Jump Jet and the DC10. All very exciting!"
  - The seminar "Preparing Networks for Electric Vehicles" by Dan Martin (ETEL transformers" and Russell Watson (Northpower) on 15 June 2022. Dan Martin talked about understanding and specifying distribution substation technology, with a case study on improving the substation utilization with public EV chargers being connected. Russell Watson presented engineering considerations of connecting electric transport to a network. Over 250 people (66 from IEEE) attended this seminar.
  - The presentation "Decarbonizing distribution transformers - Energy efficiency metrics used in New Zealand" by Dr Bhaba Das, the Lead Digital Business Developer at Hitachi Energy (Transformers Business Unit) for Asia Pacific Middle East & Africa region. The presentation was on 18 May 2022, with 80+ attendees (15 from IEEE).
  - The ENZ EEG presentation "Low Voltage Switchgear and Controlgear Assemblies" by Brendon Clarke, a Principal Electrical Engineer with Aecom, on HV and LV Upgrades - High Criticality and Brownfield Sites. The event was on 16 March 2022, with 100+ attendees (21 from IEEE).
  - The ENZ EEG presentation "MCDHB: Clinical Services – HV and LV Upgrades" by Brendon Clarke, a Principal Electrical Engineer with Aecom, on HV and LV Upgrades - High Criticality and Brownfield Sites. The event was on 16 Feb 2022, with 100+ attendees (18 from IEEE).

B.9 Humanitarian Technology Activities

- Humanitarian Technology related activities supported by the Section including collaboration with other OUs.
  - None
- SIGHT Activities
  - None

B.10 Community Activities

- IEEE Social activities (Family day, IEEE day, Engineers Week)"

- o We had a major social event for postgraduate student at Victoria University of Wellington on 27 June 2022. It was very successful with 30+ registrations and 30 attendees. Most of them attended the Postgraduate Symposium later in August. The cost of this event was around $800NZD for the catering and gifts.

PART C - OTHERS

C.1   Special Events

- The primary Special Event held during 2021 was the Combined Institutions Breakfast Symposium. This event included joint sponsorship from IEEE, IET and ENZ. The event was also jointly funded by the three institutions.
- We have successfully transited to the new financial system of IEEE and found the most economical way to adapt. Now we are operating two bank accounts, where our New Zealand local bank account (Westpac) is used for most operations, as the transaction fee is low for the local bank account. The CB Account (NextGen) is mainly used for international transactions such as receiving the incentives/funds from IEEE headquarters and R10. We occasionally transfer from the NextGen account to our local Westpac account to support our daily operational uses.

C.2   Relationship with National and International Societies and Non-Government Organizations (NGO)

- Nature of relationship and details of any formal agreement signed
  - o Engineering New Zealand (ENZ)
    - Collaboration Agreement signed some years back, and needs to be renewed. We have started communicating with ENZ in 2020, but the progress is slow due to the negative effect caused by COVID-19. We will follow up with the process in the new year.
    - Joint events held annually
    - Considerable overlap in membership
  - o Institute of Engineering and Technology (IET)
    - Collaboration Agreement signed some years back, and needs to be renewed. We have started the communication with IET, and received a very positive response from IET who have agreed the renewal in principle and are keen to develop closer relationships especially in regard to YP activities. However, again due to COVID-19, the progress is a bit slow. We will follow up with the process on the agreement renewal and closer collaboration with IET in the new year.
    - IEEE NZCS Secretary (and Immediate Past Chair) is also an IET Wellington Network Committee member
    - Considerable overlap in membership
    - Several joint events held annually
- Details of joint activities
  - o Primary joint event with ENZ and IET held annually is the Combined Institutions Breakfast event.
  - o Other events held on a collaborative basis as appropriate.
- Benefit to IEEE members (for example discounts, access to technical information etc.)
  - o IEEE members get to access technical seminars and other events which would not be otherwise possible without multiple membership fees
- Benefit to Section (for example help in membership development, venue facilities, cost saving etc.)
  - o Greatly increased range of activities for members with less organisational effort
  - o Leverage the scale and scope of three organisations for the benefit of members
  - o Reduces competition for members between these three organizations

C3.   Collaboration with other IEEE Sections

- o Support extended to neighboring Sections
  - o Many activities are undertaken collaboratively with the New Zealand North and South Sections

- o Several Chapters are Joint with the North and/or South Sections in order to ensure scale and scope of activities.
- o Joint activities with any other Section
  - o 31 January 2022: 2022 IEEE PreU STEM Event by the Joint Communications Society Chapter with NZ North and South Sections.
  - o 29 November 2022: The Joint WIE Webinar event on "Navigating Competitive Grant Application Processes", together with Australia New South Wales Section WIE Group.
  - o 6 July 2022: The virtual event "Why Women in Engineering?" together with Australia New South Wales Section WIE Group.
  - o 19 July 2022: The event for establishing collaborations with Iqra University, IEEE Pakistan Section, and the industry partners.
  - o 18 August 2022: The virtual event "Mentor-Mentee Relationship Development" together with Australia New South Wales Section WIE Group.

C.4 Support extended to Sub-sections & Society Chapters within the Section

- Support extended for organizing technical, educational and professional activities
  - o There are no sub-sections within the New Zealand Central Section
  - o The NZCS always works to support Society Chapters in a collaborative manner with funding as required.
  - o All Chairs of Chapters and Joint Chapters are invited to participate in monthly Section Committee meetings.
- Joint activities for membership development
  - o Society Chapter Chairs are involved in all membership development activities undertaken by the Section.
- o Support extended for the formation of a Sub-section or transition of a Sub-section into a full Section
  - o Not applicable

C.5 Best Practices of your Section (which you would like to share with other Sections for the benefits of members)

- Maintaining regular (monthly) committee meetings.
- We have defined a "Portfolio responsibilities" document, which outlines the roles and responsibilities for the various portfolios on the executive committee.
- Close coordination of activities with those of affiliated groups such as Engineering New Zealand and Institute of Engineering and Technology.
- The New Zealand Central Section has two annual activities which we believe represent best practice. These are:
  - o An annual industry breakfast seminar event which is held jointly with the local IET network and the Wellington Branch of Engineering New Zealand. This event is especially targeted at industry members from all three Institutions. It also provides an excellent platform for collaboration with our sister professional institutions operation in our region.
  - o The annual Postgraduate Symposium which involves participation across the two postgraduate universities within the NZ Central Region and typically has around 30 presentations. Prizes are awarded for the best presentations, but the greatest value is derived from the sharing of research activities from across the region. We also provide 1-year free IEEE student membership grant to the presenters to increase our membership retention and visibility of IEEE and our Section in NZ.

C.6 Problems anticipated and suggestions for solutions, if any

- New Zealand like many countries has a national engineering institution which in our case is called Engineering New Zealand. As Engineering becomes increasingly recognised as a critical discipline for the delivery of safe modern facilities, the requirements placed on engineers to ensure Continuous Professional Development and up to date competency in one's fields of practice increases to the extent that it becomes a matter of Regulatory Compliance. The Regulatory Compliance aspect is typically associated with membership and competency evaluation through the national engineering institution, which requires membership of Engineering New Zealand. The threat for IEEE is that increasingly engineers must join their national engineering institution to ensure Regulatory Compliance to practice

engineering nationally which then puts pressure on funding to also join other institutions such as IEEE. This is becoming an increasing competitive threat to institutions such as IEEE and IET in New Zealand.

- It is highly likely that some form of joint membership will be essential in the future, which enables membership of ENZ and IEEE (say) at a reduced rate relative to joining each institution separately. Our Secretary Murray Milner is a Distinguished Fellow of ENZ, and our Chair (Yi Mei), CIS Chapter Chair (and student councilor) Mengjie Zhang and WIE Coordinator (Bing Xue) are Fellows of ENZ. We will continue to apply for more ENZ Fellowship from the IEEE Committees to increase our engagement and influence on the ENZ decisions and planning.

- Maintaining dynamism within the student branches, especially with a high turnover (students are only with us for a short time). We need to focus on the attraction and retention of members within our two student branches.

- Majority of Computer Science and Engineering departments of Massey University has moved from Palmerston North to Auckland (North Section), leading to a big loss of our membership as well as balance between universities (the membership from Massey has dropped a lot). We need to work harder to maintain diversity.

PART D - GOALS AND PLANS

D.1   Continuation of project/activity in progress and their implementation plans
- Ongoing plans for 2023
    - Continue to organise our very successful joint institutions breakfast meeting for industry.
    - Continue with the successful postgraduate presentation event.
    - Continue to encourage Distinguished Lecturers to present to our members.
    - Continue to send introductory letters to all new members within the Central Region.

D.2   Goals and Future Plans
- Goals
    - To increase membership in all disciplines.
    - To encourage members to enhance their membership level.
    - To actively engage with all members within the Central Region.
    - To further encourage YP and WIE activities.
- Future Plans
    - To encourage all the coordinators to submit a yearly plan along with a budget at the first committee meeting of the year.
    - To establish our Section social media (e.g., Facebook, Tweeter) to increase our visibility.
    - To establish more awards within the Section to encourage more activity organisation.
    - To invite more committee members from industry.

D.3   Any innovative ideas to make IEEE more creative and value added for sustaining the membership retention and recruitment goals.
- As indicated in Section C6 above, it is becoming increasingly essential to find improved ways to work collaboratively with our national engineering institution, Engineering New Zealand, so that members are not unduly burdened with membership fees for both organizations. We plan to work towards two aspects: (1) engage more with the ENZ activities (e.g., through the YP events with ENZ) to enhance the relationship with them; (2) applying for more Fellowships of ENZ from our Section to increase our influence on ENZ. Then we will find ways to propose ENZ-IEEE joint membership program with the ENZ leadership team.
- We will continue to increase our local visibility through our website, social media and organised activities, to attract more members.

D.4   Business Plan for Sustainable Growth and Financial Stability.
- New Zealand has its summer holidays during December and January and so Business Planning for the New Year will commence in February 2023.
- Hence the Business Plan for 2023 is at an early stage of development for this report.
- It is expected that the Business Plan will continue the work from previous years as follows:

- o Continued support of Chapter seminars and related activities with particular emphasis on Distinguished Lectures,
- o The holding of the annual Combined Institutions Industry Breakfast event,
- o The holding of the Postgraduate Presentation Symposium by the Combined Student Branches,
- o Further increase our visibility through our Section website, social media and activities,
- o A continued emphasis on membership development and retention, noting the challenges identified in C.6 above,
- o Increased focus on Affinity Groups – finding ways to ensure continuity and growth of the Young Professionals Group and the Women in Engineering Group,
- o We will continue to apply for more ENZ Fellowship to make more engagement and influence on the ENZ decisions, to make it possible for more deep collaborations (e.g., joint membership) with ENZ.
- o We will establish special funds and awards to encourage people to organise events and provide financial support and sponsorship to them. This way, we expect to increase the visibility and influence of our Section.