Tshwane University of Technology

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2024 Faculty of ICT in perspective

IN THIS ISSUE

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Message from the Executive Dean

The Faculty of Information and Communication Technology (ICT) continues to uphold its legacy of producing skilled and future-ready graduates. Our reputation as a preferred source of talent within the ICT industry is a testament to our unwavering commitment to excellence in education and research. At the heart of our mission is the development of graduates who not only meet the demands of the ever-evolving industry but also possess the ability to innovate and create solutions to real-world challenges by using up-to-date technologies.

The Tshwane University of Technology (TUT) remains the only University of Technology in the country with a dedicated ICT Faculty, giving us a distinct advantage in specialising across a broad spectrum of ICT disciplines. With a thriving student body of over 7000 individuals, and a dedicated team of 102 full-time academics and many part-time and support staff, we are uniquely positioned to offer cutting-edge research, hands-on learning, and access to emerging technologies.

As we look towards the future, the rapid advancements of the Fourth Industrial Revolution continue to shape the global landscape. At the core of this transformation lies ICT, driving industries forward and revolutionising how we work and interact. Our Faculty is deeply involved in pioneering projects and research that explore and address the implications of emerging technologies. Our focus remains on areas such as Internet of Things, Virtual Reality, Cybersecurity, Data Science and Analytics, Artificial Intelligence, Machine Learning, Image Processing, Business Computing, and System Integration.

Our research outputs of 2024 reflect the Faculty's ongoing dedication to advancing knowledge and innovation. With 44 journal articles, 43 conference papers, and 6 book chapters, our research is contributing to the body of work that shapes ICT development both locally and internationally. Furthermore, we have seen an increase in our enrolment numbers across all departments, with over 6,800 students in undergraduate and postgraduate programs. This is a clear indication of the Faculty's growing impact and the demand for our future-ready graduates.

During 2024 we graduated 1150 students, including 1122 Diplomas, Advanced Diplomas and Postgraduate Diplomas, 20 Master's Degrees, and 8 Doctorates. This achievement highlights the Faculty's commitment to providing the ICT industry with professionals who possess the skills, knowledge, and adaptability to excel in a dynamic world.

Our partnerships with key industry players continue to drive our research and innovation efforts. From collaborating with prominent establishments such as the MICT SETA, BANK SETA, PSETA, Huawei, and SENTECH, to supporting initiatives like the Tshwane Varsity Hackathon (TVH), the Mpumalanga Artificial Intelligence Students Hackathon (MAISH), and the Limpopo Varsity Hackathon (LVH). Our faculty's flagship project in digital agriculture is making a huge contribution towards the use of artificial intelligence and computer vision in agriculture. We remain committed to enhancing the student experience, fostering creativity, and ensuring that our graduates are equipped with current, relevant skills to address real-world challenges faced by global citizens through the use of technology.

A sincere thank you to all staff and students who contribute to making our Faculty a key player in the ICT domain.

Let's continue working together to ensure that the Faculty of ICT remains at the forefront of producing highly qualified, innovative, and future-ready graduates.

1150
Graduates

1122
Diplomas, Advance Diplomas and Postgraduate Diplomas

+

20
Master's Degrees

+

8
Doctoral Degrees

DEPARTMENT HEADS

DR ROBERT HANS: HOD Computer Science

"The department of Computer Science would like to welcome all our ICT faculty first year students and hope that in the few years that you will be with us you will get empowered with skills and knowledge, which will enable you to make a difference in society and workplace. After completing your studies, you must leave TUT a better person than when you entered its campus in 2025. To be able to do so, you need to act as if you are 100% responsible for everything related to your studies. Please note, we are here to help you achieve your dreams!"

MR SENYEKI MAREBANE: Academic Manager eMalahleni Campus

"Congratulations on your admission to our department! It is a great pleasure to welcome you to the academic year of 2025. As you embark on your academic journey, you will encounter both opportunities and distractions. It is important to remain focused on the key objective: learning. Remember, no amount of teaching alone will ensure success—true success comes from your commitment to learning. May Almighty God bless you with wisdom throughout your journey"

DR MICHAEL MOETI: Academic Manager ICT Polokwane Campus

"Remain innovative by incorporating active learning, collaborative learning, technology-based learning, and game-based learning methods. These strategies will ensure that students, like you, benefit from an engaging and effective learning experience. As you move forward in your academic journey, remember that you have the ability to make a positive impact through your own dedication and innovative thinking. Keep striving for excellence and embrace the opportunities to learn."

PROF PIUS OWOLAWI: HOD Computer Systems Engineering

"As you embark on this academic journey, remember that technology is the foundation of modern society. ICT professionals are the architects of digital transformation, driving artificial intelligence, cybersecurity, software development, data science, cloud computing, networking, and many more groundbreaking innovations. The world needs problem solvers, visionaries, and innovators, and we believe you have what it takes to be one of them!"

DR TENDANI LAVHENGWA: HOD Informatics (acting)

"As students, researchers, technologists, lecturers and professionals in the field of ICT, we are positioned as problem solvers and innovators. While technology is ubiquitous, we must always remember to link our systems and solutions towards solving people, life and environmental challenges. This is fast-tracked through artificial intelligence and its influence on the emerging industrial revolutions. My personal quote is "Always be a thought ahead. Do not fear the blank page, everything started somewhere". Let us develop platforms that mature from word-counts to GenAI and beyond"

PROF TOPSIDE MATHONSI: HOD Information Technology

"Your efforts today are laying the foundation for a brilliant future. Remember, each of you brings unique talent and perspective to our Faculty, and together, you are shaping the future of technology. Every challenge that you will encounter is an opportunity to grow and improve. Keep pushing forward, stay curious, and never hesitate to ask for help when needed"

MR MASHITISHI PHURUTSI: Unit Manager ICT First Year and Foundation

"Open your heart and mind to learning, and have fun. There is no such thing as the best learning experience if it is not enjoyable. Like poet, novelist, and playwright Alfred Mercier who stated, "What we learn with pleasure we never forget." I also wish to echo the words of Mahatma Gandhi who said "Live the life to the fullest as if you were to die tomorrow and Learn as if you were to live forever." Lastly I need students to understand learning through the words of Albert Einstein who said "Wisdom is not a product of schooling but of the lifelong attempt to acquire it."

DR MMAMOLEFE KGASI: Unit Manager End User Computing

"ICT is continuously evolving, your dedication and curiosity will shape the innovations of the future. Stay focused, keep learning and never stop believing in your potential. The future is digital and YOU are at the centre of shaping it, keep going and good luck."

EXECUTIVE COMMITTEE MEMBERS: FACULTY OF ICT

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DR ROBERT HANS:
HOD Computer Science

PROF PIUS OWOLAWI:
HOD Computer Systems Engineering

DR TENDANI LAVHENGWA:
HOD Informatics (acting)

PROF TOPSIDE MATHONSI:
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Senior HR Officer

MR TUMELO MMATABANE:
Research Officer

LONG SERVICE AWARD RECIPIENTS

ICT professoriate
welcomes new addition

Embarking on the journey from an undergraduate student to prominent professor, was truly a web of experiences, challenges and significant milestones for Prof Topside Ehleketani Mathonsi, newly promoted Associate Professor at the Faculty of Information and Communication Technology.

Prof Mathonsi (35) from the Magomani village, Malamulele in Limpopo, said a number of key moments marked his journey to becoming a professor and significantly shaped his academic career. “One such experience was my participation in the Innovation Hub (CoachLab@Hub) graduate programme during my undergraduate years. This opportunity ignited my passion for research and also introduced me to the dynamic world of academia,” he said.

Another defining moment was his decision to pursue a Master’s degree. During this time, he was privileged to work closely with Prof Paul Kogeda, a renowned expert in Internet of Things (IoT), Fifth generation (5G) and Wireless Communications Systems/Broadband Cellular Networks. Under his guidance, Prof Mathonsi honed his research skills and developed a deeper understanding of the intricate nuances within his chosen discipline.

He believes in the transformative power of education and explained his teaching philosophy - to create a student-centred, inclusive and innovative learning environment. By emphasising practical application, critical thinking and adaptability to technological advances, he aims to empower students with the knowledge and skills needed for success in their academic and professional journeys.

Celebrating Excellence:
Faculty of ICT honours top achievers

On 19 September 2024, the Faculty of Information and Communication Technology hosted its annual Top Achievers Awards ceremony, a prestigious event recognising the outstanding accomplishments academic excellence, innovation, and dedication of its students and staff members.

Opening the ceremony, Dr Etienne van Wyk, Executive Dean of the Faculty of Information and Communication Technology and Interim Campus Rector of Soshanguve Campus, emphasised the importance of fostering a culture of excellence and continuous improvement, while applauding the Faculty's commitment to advancing education and research in the rapidly evolving field of ICT.

One of the major highlights of the awards ceremony was the recognition of the Faculty's top student achievers across various academic levels:

- **Best Diploma Student:** Lungelo Mkhwemte
- **Best Advanced Diploma Student:** Jahid Miah
- **Best Postgraduate Diploma Student:** Luthando Gqulu
- **Best Master's Student:** Relebogile Langa
- **Best Doctoral Student:** Ngoanamosadi Mphahlele

These students exemplify academic rigor, innovative research and a passion for technology, setting high standards for their peers and future cohorts.

Staff members from the Faculty who have advanced their academic qualifications, reflecting the institution's dedication to professional development, were also recognised. These include:

For 2022:

- Dr Daniel Chuene – PhD in Computer Science
- Lorraine Ntsoane – Master of Computing in Informatics
- Tumelo Malebane – MTech in Information Network
- Irene Abraham-Samgeorge – MTech in Business Information Systems (Haaga-Helia)

For 2023:

- Dr Tshimangadzo Tshilongamulenzhe – Doctor of Computing in Information Technology
- Dr Refilwe Mogase – Doctor of Computing in Informatics
- Dr Tlou Ramabu – PhD in Computer Science
- Dr Elias Rankgapola – PhD in Information Systems
- Sydney Sediela – Master of Computing in Computer Science
- Molebogeng Mashilo – Masters in Economics and Comparative Local Development
- Tshepho Raphiri – Master of Computing in Computer Science
- Reneilwe Maepa – Master of Computing in Computer Science
- Relebogile Langa – Master of Computing in Computer Science
- Masego Dibetle – Master of Computing in Informatics
- Thembokuhle Magudulela – Master of Computing in Informatics

For the first semester of 2024:

- Dr Carla Coetzee – Doctor of Philosophy in Information Systems
- Sinnah Mokhutso – Masters in Office Management and Technology
- Jade Kallis – Master of Business Administration (Haaga-Helia)

The event also celebrated groundbreaking research through the Research Awards, honouring contributions across different levels of expertise for 2022 and 2023.

For 2022:

- **Woman Researcher of the Year (Winner):** Prof Chunling Du
- **Woman Researcher of the Year (Runner-Up):** Dr Agnieta Pretorius
- **Young Researcher of the Year (Winner):** Prof Topside Mathonsi
- **Young Researcher of the Year (Runner-Up):** Dr Tope Adeyelure
- **Senior Researcher of the Year (Winner):** Prof Pius Owolawi

- **Senior Researcher of the Year (Runner-Up):** Dr Michael Moeti
- **Emerging Researcher of the Year (Winner):** Dr Michael Moeti
- **Emerging Researcher of the Year (Runner-Up):** Prof Topside Mathonsi

For 2023:

- **Woman Researcher of the Year (Winner):** Prof Chunling Du
- **Woman Researcher of the Year (Runner-Up):** Dr Agnieta Pretorius
- **Young Researcher of the Year (Winner):** Prof Topside Mathonsi
- **Young Researcher of the Year (Runner-Up):** Mr Vianney Kambale
- **Senior Researcher of the Year (Winner):** Prof Pius Owolawi
- **Senior Researcher of the Year (Runner-Up):** Prof Topside Mathonsi
- **Emerging Researcher of the Year (Winner):** Dr Tshinakaho Seaba
- **Emerging Researcher of the Year (Runner-Up):** Dr Tope Adeyelure

The Lecturer of the Year Award for 2023, a prestigious accolade recognising exceptional dedication to teaching and student success, was a standout moment of the Top Achievers Awards. Patricia Msimanga from the Department of Computer Science, was announced runner-up, while Sydney Sediela from the First Year and Foundation Unit took home the top prize. These educators exemplify the profound impact of passion and innovative teaching, inspiring students and colleagues to strive for excellence.

Faculty of ICT honours tutors and mentors for *impactful contributions*

The Faculty of Information and Communication Technology (ICT) hosted a celebration to honour the academic mentors and tutors who have made a significant impact on the academic journey of the Faculty's students. This event, led by Ms Molebogeng Mashilo, Faculty Academic Excellence Coordinator, highlighted the crucial role these mentors and tutors play in shaping the success and growth of students within the Faculty.

The celebration recognised the dedication, hard work and unwavering support that academic mentors and tutors provided to students throughout the year. These mentors and tutors transcend traditional teaching roles, offering invaluable guidance, personalised assistance and academic support to ensure that students excel in their studies.

Ms Molebogeng Mashilo, commended the tutors and mentors, emphasising the profound and positive impact they have had on the academic achievements of students in 2024. "These mentors and tutors are not only assisting the students to excel in their academia, but they are the pillars that support students, helping them to overcome challenges and reach their full potential," she said. "Their dedication to fostering an environment of academic excellence cannot be overlooked and today, we celebrate their commitment."

"Mentorship is an essential component of academic success, particularly in a field as dynamic and fast-paced as Information and Communication Technology. The mentors and tutors at the Faculty of ICT provide students with much-needed support in navigating the complexities of their coursework, helping them stay on track and overcome obstacles along the way. These mentors play an integral role in building students' confidence, offering insights and guiding them through academic difficulties. Whether it is to explain a complicated concept, provide extra study materials, or simply offer encouragement, these tutors and mentors are at the heart of student success," she concluded.

The 2024 celebration of academic support at FoICT was a powerful reminder of the importance of mentorship in shaping the academic journey of students. Thanks to the dedication and hard work of tutors and mentors, the Faculty ensures that students are well-equipped to succeed in their studies and future careers. Ms Mashilo and the academic team at FoICT are proud of the lasting impact these mentors and tutors have made and look forward to continued success in the years ahead.

"These mentors and tutors are not only assisting the students to excel in their academia, but they are the pillars that support students, helping them to overcome challenges and reach their full potential."

Ms Molebogeng Mashilo

CELEBRATING WOMEN IN TECH:

empowering future ICT Faculty innovators

In celebrating Women's Month, the Faculty of ICT hosted a Girls in Tech event on 16 August 2024. The highly anticipated occasion brought together some of the most influential women in South Africa's tech industry to engage with female students, inspiring them through personal stories and valuable insights into the challenges and triumphs of navigating the tech world.

Hosted by Phaphama Tshisikhawe, Spokesperson for Tshwane University of Technology, her welcome address set the tone for an enlightening day during which students could hear from role models who are leading in what has traditionally been a male-dominated industry.

In her address, Prof Joey Jansen van Vuuren from the Department of Computer Sciences, reflected on the long history of challenges that women have faced in the ICT domain. She outlined the barriers women have overcome over the years and emphasised the importance of women having faith in their own abilities. Prof Jansen van Vuuren encouraged women to recognise their strength and potential, reminding them that they possess far more power than they often realise.

Her address was followed by a panel discussion featuring three powerhouse women in the ICT and technology sectors. Noxolo Kubheka Dlamini,current Chief Information and Digital Officer at Telkom; Ms Jeanet Rapetswa, an accomplished ICT professional with extensive experience in software development and data engineering; and Dr Mseteka, a post-doctoral research fellow at TUT and former IT specialist in the mining sector.

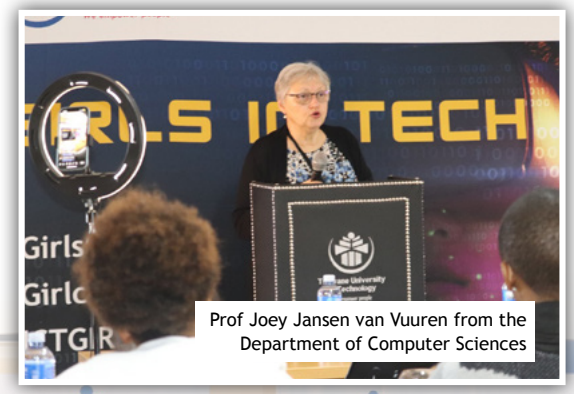
Each panellist shared their unique career journeys, detailing both the hurdles and the triumphs they encountered as women in tech. Dr Dlamini, with her impressive track record at leading organisations such as Transnet and the Airports Company South Africa, emphasised the importance of resilience and innovation. She stressed that breaking into senior leadership positions in tech requires expertise as well as a commitment to learning and evolving in the fast-paced digital world.

Ms Rapetswa, who completed her BTech at FoICT in 2021, shared her journey from being a young student to becoming a professional working in both large corporations and smaller companies. Her passion for software development and data engineering was evident as she spoke about the crucial technical skills she has acquired, including proficiency in programming languages such as C#, Java, and Python, as well as mobile and web development.

Dr Mseteka's recounted her transition from a graduate to an IT specialist in the mining sector. Her story resonated deeply with the students with her journey illustrating the power of persistence and the willingness to step out of one's comfort zone. She now serves as a post-doctoral research fellow at TUT, a role she is passionate about, as it allows her to shape the future of ICT in academia.

The panellists spoke candidly about the obstacles they faced as women in the tech industry, from gender bias to navigating male-dominated spaces. Each of them emphasised the importance of seeking mentorship and support from male and female colleagues, as well as the significance of cultivating a supportive network. Their advice to the students was clear: don't let setbacks define you; use them as stepping-stones towards greater success.

Dr Thembeka Manetje, facilitator of the Girls in Tech empowerment programme at the Faculty of ICT, emphasised the significance of such gatherings in shaping the next generation of female ICT professionals. She reiterated the Faculty's commitment to nurturing young female talent and providing them with tools they need to succeed in their careers. "The Girls in Tech panel discussion was not only an educational and motivational event, but also an opportunity to celebrate the incredible achievements of women in the ICT sector. By exposing students to prominent female role models, TUT is helping to pave the way for future leaders who will shape the tech industry and make meaningful contributions to society," she concluded.



Prof Joey Jansen van Vuuren from the Department of Computer Sciences

Computer Science's Departmental Head, **DR ROBERT HANS,** receives C3 NRF rating

Head of the Department of Computer Science at the Faculty of Information and Communication Technology (FoICT), Dr Robert Hans, has received a C3 rating from the National Research Foundation (NRF). This recognition marks a significant achievement in his career and highlights his role as a leading figure in advancing technological education and research at the Tshwane University of Technology (TUT).

For Dr Hans, the rating is not just a personal accolade but a reflection of his commitment to contributing meaningfully to the field of Computer Science and to furthering the University's research outputs.

"I see the NRF C3 rating as a significant milestone in aligning my work with TUT's broader vision of becoming a leader in technological education. This recognition is a clear indication that my research has made a positive impact in my field, while it also validates the importance of my area of study," he explained.

According to him, such ratings will encourage more students and staff to engage in research, strengthening the University's research culture and enriching the educational experience within the Department of Computer Science.

The recognition has definitely motivated Dr Hans to advance his research ambitions, among others to seek additional research funding and setting his sights on earning an even higher research rating in the future.

Reflecting on his academic and professional journey, Dr Hans identified important moments that contributed to his success, the most important of these was obtaining his PhD in 2021. This significant personal achievement helped him to establish a focused research niche.

"The many publications that I produced during my doctoral studies laid the foundation for my C3 rating, with each publication contributing to the body of knowledge in my specialised field of research," he said.

Dr Hans is convinced that this recognition will encourage postgraduate students to become involved in research opportunities that could have a lasting impact on academia and society. He has identified various research areas for further pursuit and is eager to involve students and the Faculty in these exciting new opportunities.

According to him, interdisciplinary collaboration plays a critical role in driving innovation. "Computer Science is about creating technological solutions for real-world problems and solving these problems often requires drawing from a broad range of perspectives," he said.

Echoing the advice of his mentor, the late Prof Manoj Lall, Dr Hans offers valuable advice to younger academics and researchers aspiring to achieve similar recognition.

"Be focused on your research, pick a specific area and become an expert in it. Research is a marathon, not a sprint. It requires patience, endurance and the ability to stay motivated through challenges. My 'can do' attitude as well as the support of colleagues and mentors played an important role in my journey to receiving the NRF C3 rating ."

As the Head of the Department of Computer Science, Dr Hans is dedicated to advancing the University's research and ensuring that TUT remains at the forefront of technological education and innovation in South Africa and beyond our borders.

TUT Computer Science scholar chosen for USA Fulbright Scholar-in-Residence Programme

Dr Michael Moeti (44), a distinguished Tshwane University of Technology (TUT) scholar in Computer Science, has been selected for the 2024-2025 Fulbright Scholar-in-Residence Programme at the Bluegrass Community and Technical College (BCTC) in Kentucky, USA. This prestigious opportunity aligns well with Dr Moeti's expertise and represents a remarkable achievement in his field.

"I am overwhelmed by this incredible scholarship opportunity. Having grown up in a rural setting, the path to achieve my dreams in computing was not always clear, but with perseverance and support, I have come this far. The unwavering encouragement of my family, mentors and community, has been my driving force. I will use this opportunity to make a meaningful impact. Thank you for believing in me," said Dr Moeti, an academic manager at the department of Computer Science, Faculty of ICT, Polokwane Campus, who hails from Moletjie ga-Moeti.

The Fulbright Scholar-in-Residence Programme is an initiative aimed at enhancing internationalisation efforts at US higher education institutions, inviting scholars from outside the United States to collaborate with US colleges and universities for a semester or full academic year. Dr Moeti's selection to this prestigious programme reflects his academic excellence, leadership potential and commitment to advancing computer science education on a global scale. His participation in the Fulbright Scholar-in-Residence Programme will undoubtedly leave a lasting impact on both the academic community at BCTC and the broader field of computer systems education.

He will be involved in various initiatives aimed at advancing computer science education during his residency at the Bluegrass Community and Technical College. Specifically, he will work with programs such as the Computer Science Program, the Computer Information Technology Program and the Engineering Technology Scholars Program. In addition, he will present teaching courses in Computer Science, Computer Information Technology, Computer Engineering Technology, or Cybersecurity, thereby enriching the academic experience of students and the faculty alike.

As a Fulbright Scholar-in-Residence, Dr Moeti will also contribute to the development of interdisciplinary programs, curriculum enhancements and international cooperation initiatives. Moreover, he will engage in on-campus and community activities to promote cross-cultural understanding and collaboration.

Aspiring Informatics Diploma student's *journey kicks off* at TUT

Anele Nkala (19), from Newcastle, Osizweni in Kwazulu-Natal's future as an ICT student has kicked off at the Tshwane University of Technology's Faculty of Information and Communication Technology (FoICT). The first-year student, who obtained four distinctions in Matric, has enrolled for a Diploma in Informatics, which will take him straight into the realm of business analysis, information systems and programming languages.

"The journey is both thrilling and daunting; filled with the anticipation of discovery and the challenges of mastering new concepts. With my strong academic background, I am ready to navigate my way through and juggle my theoretical and practical studies. I am a determined person who is always eager to do better and I believe that adapting to the fast-paced nature of technology through encountering challenges will certainly open opportunities for growth. In addition, following in the footsteps of my uncle, a computer whiz kid who also studied at FoICT, fuelled my interest to learn more about ICT," he said.

"Dedicating myself to my studies and developing smart learning techniques will be core to my academic success and overcoming challenges. In addition, I will ask for help from the lecturers, tutors, mentors, my peers as well as my mother, who is my biggest support system," he added.

He explained that he wants to master the various programming languages and technologies based on the institution's needs and requirements. Whether it is Python, Java, AI or other emerging technologies.

Anele envisions applying his ICT skills to create a positive impact and enhancing efficiency in industry or in the broader societal context. He would also like to leverage his ICT skills to contribute towards developing sustainable and inclusive technologies in future.

Harnessing the power of 4IR for agricultural transformation: a spotlight on Patrick Motshwene's contribution

In the evolving landscape of the Fourth Industrial Revolution (4IR), industries across the globe are rapidly adapting to new technologies that reshape their operations. The agricultural sector, often viewed as traditional and labour-intensive, is no exception. At the forefront of this transformation is the need for skilled professionals capable of embracing and utilising cutting-edge technologies. Patrick Motshwene, an academic technician at the Department of Computer Systems Engineering, is one such individual who makes a significant impact in the realm of 4IR and agriculture.

On 10 October 2024, Ms Nozipho Khumalo, Deputy Director from the Department of Higher Education and Training specially invited Motshwene , to present at a prestigious webinar entitled *TVET Colleges Utilising 4IR in Farming Management and Primary Agriculture*. Attracting more than 400 lecturers from TVET and vocational colleges across South Africa, the event focused on integrating 4IR technologies into farming and primary agriculture programsme to nurture a new generation of skilled workers.

Motshwene's journey into the world of 4IR in agriculture is deeply rooted in his personal and professional experiences. Growing up, agriculture was part of his world. He recalls his early days selling fruits and vegetables, directly sourcing his products from farms. This hands-on exposure to farming gave him valuable insight into the challenges farmers faced and the potential for technological intervention in overcoming those hurdles.

However, Motshwene did not stop there. He pursued a formal education in Computer Systems Engineering, a field that opened his eyes to the transformative power of technology. He further expanded his knowledge through studies in Satellite Technology and Satellite Remote Sensing, gaining a deep understanding of how these advanced technologies can be applied to agriculture. His diverse academic and professional background in technology and farming placed him in a unique position to discuss the intersection of 4IR and primary agriculture.

At the webinar, Motshwene took center stage as a panellist, delivering an insightful presentation on *the Utilisation of 4IR in Primary Agriculture*. His presentation underscored the importance of adopting advanced technologies such as artificial intelligence (AI), drones, remote sensing and satellite data to enhance farming practices. By harnessing these tools, farmers can make more informed decisions, improve yields and reduce operational costs.

One of the key points Motshwene highlighted, was the potential of satellite technology in monitoring crop health, optimising irrigation and predicting weather patterns. These innovations, powered by AI and machine learning, enable farmers to make real-time decisions that were previously unattainable. Additionally, he discussed how remote sensing technologies allow for the precise mapping of farmland, which helps in identifying areas that require specific interventions, thereby minimising waste and maximising efficiency.

Motshwene also emphasised the critical role that TVET colleges play in equipping the workforce with the necessary skills to implement these technologies. With the agricultural sector becoming increasingly reliant on advanced technology, it is essential that the next generation of agricultural workers is not only knowledgeable about farming practices but also proficient in the use of 4IR tools. This is where the collaboration between educational institutions and the farming community becomes vital. Motshwene's presentation was a call to action for educational institutions to integrate 4IR technologies into their curricula, ensuring that students are prepared for the future of farming.

Pioneering the future:
highlights from Faculty of ICT's annual research day

An undisputed highlight of the year, the Faculty's annual research day, provides a platform for students, researchers and Faculty members to display their pioneering work in the dynamic and ever-evolving Information and Communication Technology (ICT) world.

Dr Agnieta Pretorius, Assistant Dean for Postgraduate Studies, Research and Innovation at the Faculty of ICT welcomed guests and highlighted the importance of the Faculty Research Day to celebrate the transformative research conducted by TUT's postgraduate students. She commended the remarkable progress the University has made over the years, particularly in the field of ICT.

Reflecting on TUT's global rankings, she said in 2023 the University was ranked among the top 600 institutions worldwide in Engineering and Computer Science according to The Times Higher Education Rankings and fifth nationally in the Young University Rankings. These rankings, along with TUT's top 50% position in 90 research fields, reflect the University's unwavering commitment to practical, impactful research that addresses both industry and societal needs. TUT's global standing was further reinforced by its positions in Edu Rank and Webometrics, placing the University among the top institutions worldwide.

Speaking about the "Denotation of Superintelligent Society", Prof O Olugbara, Executive Dean of the Faculty of Accounting and Informatics at Durban University of Technology, delved into the implications of artificial intelligence and its potential to redefine society. His speech set the tone for the day, exploring how emerging technologies could be harnessed to address complex global challenges, while considering the ethical implications of technological advancements.

As the world continues to embrace digital transformation, the significance of ICT has reached new heights. From artificial intelligence (AI) and machine learning to cybersecurity, data science and the Internet of Things (IoT), technological advancements are revolutionising how we live, work and communicate. The Research Day highlighted how these technologies are reshaping industries as well as solving real-world problems, bring about meaningful impact in societies worldwide.

During the day, the latest ICT breakthroughs as well as challenges and ethical considerations that accompany them were explored. Discussions underlined the importance of research and development in ICT to drive progress, but also for addressing societal issues, from privacy concerns to the implications of AI.

The programme comprising diverse presentations and guest speakers, enriched the day. Attendees heard from researchers, academics and industry professionals who are pushing the boundaries of technological possibilities.

Topics included innovative research such as:

- A Mining Cybersecurity Decision Support Model (MCSDSM), aimed at enhancing decision-making in cybersecurity.
- A Blockchain-Based SRC Electronic Voting System, designed to function effectively even in areas with low bandwidth.
- The Application of Principal Components Analysis (PCA) and Artificial Neural Networks (ANN) for predicting the Quality of Service (QoS) in Free Space Optical (FSO) links in South Africa.
- A Comparative Study on Convolutional Neural Network-Based Animal Classification, focusing on custom architecture VGG16 and AlexNet
- Automatic selection of security controls for cloud services using N-gram and C4.5 algorithm
- An efficient second-hand vehicle price prediction based on light LightGBM Machine Learning Algorithm: South

African case study and more.

The participants shared their insights and solutions through two formats: oral and poster presentations. Each presentation highlighted the potential of technologies like artificial intelligence, blockchain, and IoT in transforming industries and improving lives.

The winners of the Oral Presentations were:

1. Gomolemo Bokaba
2. Zenzele Msiza
3. Samuel Adebusola

On the Poster Presentation front, individuals who received acknowledgement for outstanding work were:

1. Nhlalala Makondo
2. Dimakatso Melebana
3. Sibusiso Mzulwini

To catch up on the Faculty of ICT's Research Day click here: https://www.facebook.com/TUTCommunications/videos/3922878054648294/?app=fbl

Swiss-based research organisation

MAKES SIGNIFICANT DONATION TO FOICT

The Faculty of ICT received a significant donation of computing equipment from CERN, a renowned Switzerland-based research organisation.

In the ever-evolving world of science and technology, curiosity often sparks transformative opportunities. For Nceba Botha, a Laboratory Technician at the Faculty of ICT, this curiosity about global scientific developments led to an unexpected and impactful journey.

Botha's interest was piqued by the groundbreaking work being done at CERN, the European Organization for Nuclear Research. Known for its monumental projects, including the Hadron Collider and the invention of the World Wide Web, CERN represents the pinnacle of scientific exploration and innovation. Delving deeper into CERN's initiatives, Botha discovered a remarkable program: a commitment to donating computing equipment to educational institutions across Africa.

Recognising the immense potential this opportunity could offer to the Faculty of ICT, Botha took the initiative to submit a formal request to CERN. The goal was clear—securing state-of-the-art computing equipment to enhance the learning environment and resources available to TUT students.

The journey from a spark of curiosity to a formal request to one of the world's leading scientific organisations, highlights the power of initiative and the importance of staying informed about global advancements. Botha's efforts demonstrate how a single individual's vision and determination can bridge the gap between global scientific progress and local educational development.

This donation has the potential to significantly bolster the Faculty of ICT's resources, providing students with access to cutting-edge technology and inspiring future innovations. As the Faculty awaits CERN's response, Botha's story serves as a reminder of the boundless opportunities that can arise from a curious mind and a proactive spirit.

This donation marks just the beginning of their journey towards becoming leaders in technology and includes: fourteen computing nodes; six storage servers; and five switches, all equipped with quad CPUs, offering robust processing capabilities essential to achieve the University's academic and research goals.

"This donation will greatly benefit TUT in the Faculty's process of transitioning to using thin clients, which require more storage and processing power. The donated equipment will act as central servers, allowing students to access powerful computing resources efficiently. Additionally, the new data center will enable further advancement in research and education. The donation aligns perfectly with TUT's mission to prepare students for the future. TUT aims to provide its students with the best possible education and resources, improving their chances of securing employment upon graduation," said Nceba Botha.

The process of coordinating the donation involved careful planning and collaboration with freight forwarders to ensure the equipment reached TUT safely. While there were some challenges along the way, they were managed effectively, leading to the successful delivery of the computers. Nceba added that his perseverance paid off, despite the long process, resulting in a positive outcome that will benefit many.

Breaking barriers:
Dr Anna Segooa's inspiring journey to becoming senior lecturer

Dr Anna Segooa, lecturer from the Faculty of ICT's Department of Informatics has been promoted to senior lecturer. This is a significant milestone in her career, highlighting her exceptional contributions to the field of engineering and technology. Her journey, marked by resilience and dedication, is a powerful example of how passion and perseverance can lead to remarkable achievements.

"The fact that I am a woman has never impeded my success. I view myself as a human being capable of achieving any goals I set. Challenges are simply opportunities for growth and my commitment to engineering and technology has been a driving force throughout my career. Inspired by a supportive family and a belief in my own capabilities, I have navigated the challenges of my field with determination and confidence," she shared.

Dr Segooa's promotion recognises significant research contributions and impactful projects. Her doctoral work, collaboration with experts and mentorship of postgraduate students have been instrumental in advancing her field. Her research has consistently addressed societal challenges, focusing on areas such as education and healthcare.

Mentorship has played a pivotal role in Dr Segooa's career. She credits networking and collaboration as key drivers of her success, since she herself is the product of mentorship and support.

"Choosing a career is my responsibility, but succeeding in the field requires guidance from those more senior. The support I have received from experts in my field has been instrumental in my professional growth. Balancing a demanding academic career with personal responsibilities has been a significant challenge; being an academic requires presence in teaching, research and community work. Balancing these with family life calls for dedication and discipline," she explained.

Dr Segooa is enthusiastic about the role of engineering and technology in Africa's development. She believes innovative solutions are crucial for addressing societal problems on the continent. With advancements like Artificial Intelligence and Big Data Analytics, she believes problems can be identified in real-time and deliver efficient solutions. Her vision includes fostering inclusive development and bridging the digital divide through user-centred approaches and design thinking.

Looking ahead, Dr Segooa is excited about her role as a senior lecturer and her future endeavours. Her current projects include collaborations with international universities and the development of frameworks for incorporating diversity, equity, and inclusion in engineering education. She thanked her peers and the broader scientific community.

ICT Faculty's students shine at
AGRI-TEEN SYMPOSIUM

The Faculty of ICT participated in the annual AGRI-Teen Symposium, hosted late in June by the Department of Rural Development and Agrarian Reform (DRDAR) in collaboration with the Department of Education. The two-day event aimed to foster career awareness among learners in the agriculture and rural development sectors across various towns in the Eastern Cape province.

The symposium serves as a platform to introduce high school leaners from 17 Agricultural high schools in the Eastern Cape to a spectrum of opportunities within agriculture and showcasing modern technological applications and innovations that are shaping the future of the sector.

Displaying several cutting-edge projects, six students from the Faculty of ICT, Charles Ngala, Amogelang Sibanda, Mavis Masemola, Manzezulu Mazibuko, Sipho Mahlangu and Tshepiso Selopatsa made a significant impact at the symposium s. These included an Agriculture website designed to provide farmers with valuable information on crop management, soil fertility, market trends and agricultural practices.

Another project that stood out, an Egg Fertility Tester, offers quick and accurate testing of egg quality to help farmers maintain high standards in their produce. Advanced Incubator technology also on display, aimed at optimising hatchery processes for poultry.

Drone technology demonstrated precision agriculture capabilities, allowing farmers to monitor crops remotely with high accuracy. The team also shared their work in Animal Intrusion Detection using Renewable Energy, harnessing renewable sources to power systems that detect and deter animal intrusion, thus safeguarding farms and preventing livestock theft.

Computer Vision applications for AI-driven image analysis in agriculture, assist in disease detection, yield estimation and automated farm management. Lastly, innovations in Greenhouse Technologies were presented, focusing on optimising crop production in controlled environments.

The presence of TUT's ICT Faculty at the AGRI-Teen Symposium underscored their commitment to bridging the gap between technology and agriculture. By engaging directly with the learners and educators, they not only showcased their technological advancements but also inspired the next generation of agricultural innovators.

Patrick Motshwene, Academic Technician from FoICT, spoke about Technological innovations in agriculture, with Artificial Intelligence (AI) in Agriculture, explaining the concepts and categories of AI and talking about AI in Agriculture 5.0. He emphasised the role of agriculture in the world economy, the effectiveness of Drones in Agriculture and the importance of the student projects on display.

TUT empowers community through
COMPUTER LITERACY INITIATIVE

In a first for the university, the End User Computing Unit at the Faculty of ICT, in collaboration with the Office of the Campus Rector, launched the first annual community awarding certificate ceremony at the Council Chamber, Soshanguve South Campus, late in March 2024.

In recognising of the lack of digital literacy in communities, the Unit and has set out on a quest to close the digital divide with its transformative community computer literacy project. In equipping people and communities in Soshanguve with the knowledge and abilities required to prosper in the digital era, the six-week long programme that will be offered twice a year, brings hope for the future to these communities.

In his address, Dr Etienne Van Wyk, Executive Dean, Faculty of ICT and Soshanguve Campuses Interim Campus Rector, emphasised that learning knows no bounds. “Every step forward, no matter how small, brings everyone closer to their set goals,” he said.

“The significance of this course lies in the fundamental skills it imparts and the opportunities it unlocks. In today’s digital age, computer literacy is not just a skill, it is a necessity. It opens doors to countless possibilities, both personally and professionally. It empowers individuals to navigate the ever-evolving landscape of technology with confidence and ease.”

The programme covers a wide range of topics, including computer fundamentals, internet navigation, word processing and spreadsheet management. Through firsthand learning experiences and interactive sessions, participants gain practical skills that empower them to utilise technology effectively in various aspects of their lives.

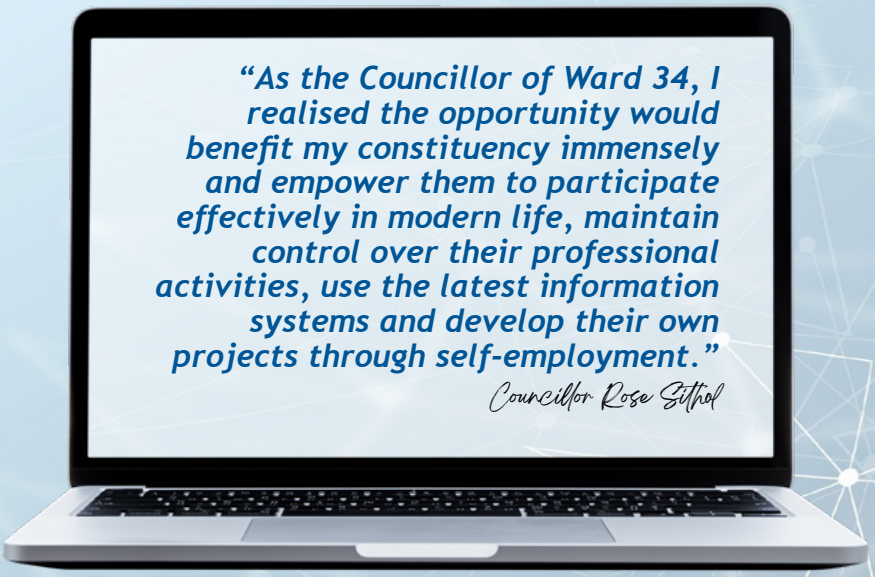
According to Programme Facilitator, Modiegi Phalane, the programme targets teachers, police, churches and the community in general. Amidst the 100 participants were Bethsaida School teachers from Block L, Soshanguve, Mahwireta teachers and the principals from Mabopane, Soshanguve, Winterveldt and Ga-Rankuwa as well as Soshanguve Community, majority being youth from Ward 34.

According to Councillor Rose Sithole, the response from the community was overwhelmingly positive. “When TUT Soshanguve approached my office in 2023 with their proposal

to plough back to the community through Computer Literacy training with no age restriction, I was really excited.

“As the Councillor of Ward 34, I realised the opportunity would benefit my constituency immensely and empower them to participate effectively in modern life, maintain control over their professional activities, use the latest information systems and develop their own projects through self-employment.”

She added that the people from Ward 34 immediately registered their names with her office when she shared the opportunity with them. “These names were submitted to TUT but unfortunately many of those who registered, were also employed at the time and could not attend the classes. However, those who could attend are grateful for the opportunity and the certification by TUT. More residents would like to participate in the programme, and we look forward to the next cycle of training presented by TUT. An educated community leads to a flourishing community,” concluded Councillor Sithole.



FACULTY OF ICT ADOPTS
Sikhululekile School of Specialisation

Adoptee of the Tshwane University of Technology's Faculty of Information and Communication Technology (FoICT), the Sikhululekile Secondary School in Temba, Hammanskraal, was formally renamed Sikhululekile Maths, Science & ICT School of Specialisation on 8 February 2024. The Faculty of ICT adopted the school to assist them with ICT training, equipment and projects, after the announcement that the school was earmarked to become a school of specialisation in maths, science and ICT and that it would be the only ICT specialisation school in Tshwane North.

Gauteng Education MEC, Matome Chiloane, attended the launch of this pioneering initiative that signals a commitment to providing learners with a tailored and advanced educational experience in the ever-evolving field of ICT.

MEC Chiloane said schools of specialisation are revolutionary and ground-breaking programmes of the Department of Education. "We are making good progress in educating children to have much-needed skills for the future. Through our schools of specialisation, learners get workplace exposure and career guidance in their chosen fields, while we prepare them for the transition to pursue higher education and training. Learners in our schools of specialisation also have the added advantage of being exposed to the outside world through project-based learning. They really thrive and demonstrate daily how smart they are," he added.

Daphney Chuene, the Principal of Sikhululekile Maths, Science and ICT School of Specialisation explained that the school will focus on Research and Innovation, while the curricula are designed to include both theoretical concepts and practical skills development.

"This involves a mix of classroom instruction, laboratory sessions, projects and internships. For instance, last year our learners had an opportunity to learn from TUT academic staff and students in one of the Faculty of ICT laboratories. During these sessions they were exposed to theoretical concepts and given opportunities for hands-on practical application," she said.

"Whilst preparing for the launch, learners had to create a project that addresses a challenge experienced at school. They opted to create a website which can be used to communicate directly with parents. It included a chat bot to respond to the frequently asked questions about the school and curriculum offered. The website will give learners the ability to catch up and communicate with teachers if they are absent or falling behind," she added.

To ensure the programme's success Sikhululelike has partnered with the CSIR and FoICT's Social Coding, while the Department of Basic Education at provincial level aids with the introduction of CAT and IT subjects, which are already CAPS-aligned, at the school. Hence, the curriculum is already tailored and quality assured to be understood by learners at secondary school level.

Thom Leholo, Academic Technician from the Department of Computer Systems Engineering, supervised the development of the ICT projects for the launch event. "The aim is to equip Sikhululekile SOS learners with skills and knowledge they will require to thrive in an increasingly digital and technology-driven world. In addition, we want to expose them to the fascinating world of ICT. The project emphasizes the importance of digital literacy skills, including the ability to critically evaluate online information, distinguish between reliable and unreliable sources and to protect personal data and privacy online," he said

Dr Etienne van Wyk, Executive Dean, said after the launch learners will continue to engage in innovation projects at the school and at the Faculty's labs. "Adopting the school as a community engagement project, the Faculty provides a gateway to a transformative educational journey, unlocking opportunities for staff and learners. Together, we pave the way for a symbiotic relationship that enhances the school's ICT curriculum, fosters innovation, empowers learners with cutting-edge skills and prepares them to excel in the ever-evolving digital landscape."

He added that this collaboration demonstrates a shared commitment to excellence, driving forward the next generation of tech-savvy leaders while ensuring a dynamic and enriched educational experience for all.

Faculty of ICT's Hacker Society puts spotlight on
CHALLENGES YOUNG WOMEN IN TECH FACE

The Hacker Society hosted the "Why Women" event on 15 October 2024 at the Student Centre, in Soshanguve South. The initiative highlighted the underrepresentation of women in the tech industry.

The event provided a platform for women to share their experiences in tech and inspire one another. It also aimed to encourage young women to pursue careers in technology.

The event featured interactive network sessions and panel discussions that offered valuable insights. Attendees had the opportunity to engage with successful women in tech and to learn from their journeys.

Recognising that women face unique challenges such as limited access to resources and mentorship, the Hacker Society developed "Why Women" to bridge these gaps and cultivate a community that uplifts one another.

"Why Women" aims to celebrate women's achievements in tech, address the challenges they face and foster a supportive network of women in the industry. The Hacker Society collaborated with the Girl-Code to host the event, supported by sponsors, eTalente. Enviro365 IT Solutions contributed by connecting attendees with expert speaker, Tshegofatso Dingaan.

The collective effort resulted in an engaging experience that showcased the power of teamwork in promoting diversity and inclusion in tech. Notable moments included the address by Pearl Mahlanga's, Girl-Code Facilitator, who talked about finding one's path in the tech industry.

Dingaan, a Developer at Enviro365 IT Solutions, shared insights on overcoming the imposter syndrome. Gugu Mokwena, IBM Administrator Intern at WeThinkCode, dealt with the challenges of being a woman in tech. She also talked about the importance of letting your work speak for itself in a world waiting to watch you fail as a woman. Interactive sessions allowed participants to forge connections, leading to positive feedback about increased confidence and motivation to pursue careers in tech.

"With support from sponsors and strategic marketing efforts, including social media campaigns and word-of-mouth outreach, we achieved high attendee engagement and received positive feedback," said Nsuku Ngobeni, Hacker Society's Head of Media and Marketing.

The Hacker Society plans to build on this momentum by hosting similar events, expanding mentorship programmes for young women in tech, collaborating with more organisations to amplify the impact and developing initiatives to address specific challenges women in the industry face.

Upcoming initiatives include workshops on emerging tech trends and hackathons focused on social impact.

"With support from sponsors and strategic marketing efforts, including social media campaigns and word-of-mouth outreach, we achieved high attendee engagement and received positive feedback."

Nsuku Ngobeni

Inspire ICT connects students with industry tech leaders

“Inspire ICT”, an exciting, motivational event hosted by the Faculty of ICT’s Soshanguve Campus, connected students with young professionals and leading companies in the field of Information and Communication Technology (ICT) to inspire and motivate them as well as address and improve student graduation rates.

In bringing industry experts and students into direct contact with each other, provided a unique opportunity for students to gain insights into the needs of industry and draw inspiration from those who have already achieved success in the tech world.

In his welcoming remarks, Dr Etienne Van Wyk, Executive Dean for FoICT, highlighted important attributes to ensure that “future-ready graduates are not only prepared for the jobs of tomorrow but also for the dynamic, interconnected and tech-driven world they will face.”

He highlighted attributes including the ability to quickly adapt to changing environments, technologies and job roles, innovative thinking to approach challenges creatively and develop effective solutions, commitment to continuous learning and self-improvement to stay relevant in a changing workforce, willingness to take risks, embrace innovation and think like an entrepreneur, as well as the ability to work well in teams, both physically and virtually.

Throughout the day, students had the opportunity to attend one on one interactive sessions with these young professionals who assisted them in getting familiar with LinkedIn. These sessions were not just about sharing knowledge, but also about offering real-world advice and guidance.

Two industry experts spoke about overcoming challenges in the tech industry as well as career growth and development. Both speakers shared their personal journeys, discussed the challenges they faced and highlighted the skills needed to succeed in the ICT industry.

In addition to learning from these experts, students had the opportunity to network with them while those doing their Work Integrated Learning (WIL), shared their success stories.

“An important aspect of ‘Inspire ICT’ was its focus on creating lasting memories. It was designed to be more than just an educational experience; it aimed to be a day that students would remember fondly as a source of inspiration and motivation. The atmosphere was lively and engaging, with plenty of opportunities for students to interact with each other and with the industry professionals,” said Tadiwanashe Songore, chairperson of the Faculty of ICT Student Faculty Council.

Overall, “Inspire ICT” played a key role in inspiring students and encouraging them to stay on track in the run-up to the year-end exams and ultimately towards graduation.

Department of Computer Science honours

Tech Trailblazers at Academic Excellence Awards

The Tshwane University of Technology (TUT) Polokwane Campus celebrated its 2024 Academic Excellence Awards, highlighting exceptional achievements within the Department of Computer Science. The event, held at Tech 9, brought together students, Faculty and families to honour academic excellence and future tech leaders.

Dr Walter Tshamano, TUT Polokwane Campus Rector, emphasised the University's commitment to preparing graduates for future challenges and job creation, noting "You have made yourselves, your families and the entire TUT community proud. Enjoy your achievements; we are here to celebrate your success."

The awards ceremony was testimony to the hard work and dedication of the Department's students and staff. The attendees were reminded of the importance of academic excellence in shaping the future of the tech industry, locally and globally.

Event coordinator, Frans Kgoete, explained that the awards are meant to foster a culture of excellence, celebrating top grades and hard work while motivating others. He likened the recognition to sharpening a warrior, essential for driving personal growth and tackling life's challenges.

The atmosphere was charged with a sense of pride and accomplishment as 35 students from the Department of Computer Science from extended first year to third years and three top achievers were recognised and awarded for their outstanding contributions to their studies and the broader field of technology.

Concluding the event, Dr Khuliso Sigama, Acting Academic Manager of the Department of Computer Science, acknowledged the collective efforts of students, Faculty, and staff. He praised the students for their resilience and innovative contributions, which are vital in shaping the future of technology.

"You have made yourselves, your families and the entire TUT community proud. Enjoy your achievements; we are here to celebrate your success."

Dr Walter Tshamano

TRANSFORMING HEALTHCARE:

Samuel Sithole's award-winning ICT solutions

Samuel Sithole (22), a student from the Faculty of ICT, embarked on a journey fuelled by dedication and passion to explore the global ICT landscape. His path began with participation in prestigious competitions like Huawei ICT and Vodacom, where he sharpened his networking skills and built connections within the industry.

"In 2022, I was the first-place winner in a healthcare solutions competition.Currently, the solution is in use as well as the ideas I have developed. The event, during which I received the award for the best healthcare software solution, took place at MedTech offices based in Johannesburg, also connecting virtually with international competitors, programmers and software developers," said Samuel. received

Networking was instrumental in his success. With Samuel connecting with professionals from various corners of the globe, including the UK, Singapore, Australia and Boston, he fostered collaboration and knowledge exchange. A notable partnership led him to Cuba, where he engaged with computer science students, advancing cross-cultural collaboration and enhancing ICT problem-solving capabilities.

Samuel believes that collective collaboration and sharing of abilities pave the way for transformative change. His involvement as an innovator in initiatives like the declaration of intent on cooperation between Minister Stella Ndabeni-Abrahams and her Algerian counterpart, highlights his dedication to promoting African unity and cooperation in innovation.

Samuel highlights the importance of being a change agent, while advocating for African creativity to shape global market dynamics positively. Through engagement with stakeholders ranging from investors to ministers, Samuel capitalises on networking and knowledge sharing in driving innovation.

His aspiration to empower fellow students and entrepreneurs' shines through his willingness to share insights learned from his journey. Minister Stella Ndabeni-Abrahams and Deputy President Paul Mashatile's recognition of Samuel's contribution of implementing inventions of tracking system to the market marked the significance of nurturing homegrown talent in driving Africa's socio-economic development.

Samuel also attended an event at the Cape Town International Convention Centre (CTICC) where he networked with fellow African innovators and entrepreneurs sharing ideas on how to improve ecosystems. This symbolises the potential of African innovation to catalyse growth across sectors. His journey shows the transformative power of collaboration, marking the importance of unity in diversity as Africa charts its path towards greatness.

FoICT adopts Second School of Specialisation

In 2023, the Faculty of ICT adopted the Sikhululekile School of Specialisation in Maths, Science and ICT, aimed at focusing on research and innovation to foster talent and bridging educational disparities in ICT. The Faculty has now also embarked on a pioneering venture with another secondary school, the Mapenane School of Specialisation in ICT. This collaboration marks a significant milestone in education to provide learners with specialised skills and opportunities from an early stage.

The partnership between the Faculty of ICT and the Mapenane School of Specialisation is driven by a common vision to nurture a diverse, skilled workforce ready to meet the challenges of the digital era. The aim is to establish a seamless educational pathway for learners, from secondary school to tertiary education and beyond, ensuring continuous learning to prepare individuals for success in the ICT industry.

Sikhululekile in Hammanskraal and Mapenane in Ga-Rankuwa are the only ICT specialisation schools in the Tshwane North and West areas.

"We adopted these schools to engage with the local community and contribute to the development of ICT skills at secondary education level. By fostering an interest and skills development in ICT at this level, the Faculty aims to broaden the pool of qualified applicants for its own ICT programmes in the future, providing access to resources, facilities and expertise not readily available in secondary schools,"

Dr Etienne van Wyk
Executive Dean of the Faculty of ICT

Central to this partnership, is the commitment to provide students with access to innovative resources, guidance and practical experience in ICT. Through collaborative projects, workshops and mentorship programmes, learners will tackle real-world challenges, develop critical thinking skills and be able to unleash their creative potential.

Lydia Moseki, Principal of Mapenane School of Specialisation, shared her enthusiasm about the collaboration, highlighting its potential to enhance the school's ICT specialisation through training in coding and robotics, whilst enriching the learning experience for both learners and teachers.

The partnership also aims to address the underrepresentation of certain demographics in the ICT field by promoting inclusivity and diversity. By reaching out to learners from diverse backgrounds and offering tailored support and opportunities, both the University and the school aspire to create a more inclusive and representative ICT community.

Emphasising the exciting prospects for collaboration and growth offered by the new partnership, Thom Leholo, Academic Technician from the Department of Computer Systems Engineering, highlighted that this will provide an opportunity to expand expertise, share resources and enhance the learning experience for the Faculty and its students.

Moving from good to great:
Empowering Girls in Tech at Innovator Trust Summit

On 13 November, a group of female students from the Faculty of Information and Communication Technology's Girls in Tech empowerment programme stepped into a transformative experience at the prestigious Women in Tech Summit, hosted by Innovator Trust. This much-anticipated event offered aspiring tech leaders an opportunity to connect with trailblazing women shaping the technology industry. With thought-provoking discussions and inspiring exchanges, the summit ignited fresh ideas and ambitions, empowering the next wave of female innovators.

The summit was an energetic celebration of women in technology, featuring a series of powerful panel discussions led by female industry leaders who have carved out significant roles in the tech world. These sessions were designed to empower and encourage young women to pursue their careers in tech, demonstrating that the industry is not only for the elite few but a space where diverse voices and perspectives can thrive.

The Women in Tech Summit was proudly hosted by the Innovator Trust, an organisation dedicated to supporting the growth of small black-owned Information and Communication Technology (ICT) businesses in South Africa. Through its various programmes, Innovator Trust provides critical training, resources and mentorship, helping to develop the skills of business owners and ensuring these small and medium-sized enterprises (SMMEs) become sustainable, contributing meaningfully to the ICT sector and the broader economy.

The vision of Innovator Trust aligns closely with its commitment to bridging the digital divide and driving social empowerment. It supports women entrepreneurs in the ICT space, connecting them with innovative tools that can help them transform their businesses and expand their reach. Through initiatives like the Women in Tech Summit, Innovator Trust creates an environment where women in ICT can thrive, collaborate and lead the way in tech innovation.

One of the standout moments of WIT 2024 was the insightful panel discussion on the role of Artificial Intelligence (AI) in empowering women entrepreneurs, particularly those operating in underserved rural and township markets. Vinolia Martin, a panelist from Microsoft, shared powerful insights on the transformative potential of AI in these areas.

"AI is not a one-size-fits-all solution. It is about using technology to reach where it matters most—bridging gaps in underserved areas," Martin emphasised.

This statement resonates deeply with the Innovator Trust's mission, reinforcing the importance of ensuring that technology, particularly AI, is accessible to those who need it most. By connecting women owned SMMEs with the tools they need to innovate, AI can become a catalyst for growth, providing new opportunities for business expansion and social impact.

This discussion highlighted how AI can be a powerful equaliser, enabling women entrepreneurs to overcome challenges related to infrastructure, market access and limited resources. With the right tools and training, these women can grow their businesses while also empowering their communities by creating jobs, driving economic growth and expanding access to critical services.

For the female students from TUT's Girls in Tech empowerment programme, the summit was an eye-opening experience. The opportunity to interact with leaders in the tech industry and hear first-hand about their journeys, challenges and successes was an precious experience. It reaffirmed the importance of persistence, innovation and continuous learning in the tech space.

"The Girls in Tech empowerment programme at the Faculty of ICT aims to equip young women with the skills and knowledge they need to succeed in the ever-evolving world of ICT. By providing these students with exposure to influential figures in the industry, the Faculty of ICT is helping to foster a sense of belonging and motivation for these young ladies who aspire to break barriers in the tech field", said Dr Thembeka Manetje, facilitator of the Girls in Tech empowerment programme.

Catalysts for progress:
celebrating the impact of women in technology at TUT

In honouring and advancing women in the technology sector, the Department of Computer Science, at the Polokwane Campus hosted an inspiring "Girls in Tech" event, which brought together aspiring female tech enthusiasts, students and professionals to celebrate the achievements of women in technology and to encourage the next generation of female tech leaders.

In his welcome, Dr Walter Tshamano, Campus Rector, reminded attendees that they have the strength, creativity and resilience to lead the future of technology. He emphasised that young women's voices, ideas and perspectives, are exactly what the tech world needs.

"You are not just participants; you are catalysts for progress. The challenges that you may be facing, are actually opportunities in disguise. As you continue on your path, remember that you are part of a larger movement, one that is creating a more inclusive, diverse and exciting future in technology. The road ahead may have its challenges, but it also holds endless possibilities. You have the talent, the drive and the vision to turn those possibilities into reality," he said.

The event featured a series of motivational speeches by prominent figures from various organisations designed to equip young women with the tools and instil confidence in them to excel in a traditionally male-dominated industry. Keynote speaker and trailblazing woman in tech, Malesa Ndlovu, shared her inspiring journey, encouraging attendees to break barriers and pursue their dreams with unwavering determination.

In his welcome address, Dr Khuliso Sigama, Acting Academic Manager of the Department of Computer Science, said the "Girls in Tech" event is an important platform for empowering and encouraging young women to explore careers in the technology a field where creativity and innovation can flourish and where female students can envision themselves as future leaders.

Dr Appolonia Illora, Lecturer in End User Computing from the Department of Computer Science, delivered a compelling address on the profound role and potential of girls in technology. Her discussion underscored the transformative impact that young women could have on the tech industry.

"Despite the significant strides already made in technology, the field remains a vast, open canvas. It is waiting for fresh ideas and new perspectives to shape its future. Girls entering the tech world are not merely joining an existing field; they are poised to redefine it. Their role involves introducing innovative ideas, challenging established norms and leading with creativity and resolve," she remarked.

Magnificent seven lead by example
at eMalahleni campus

The achievement of seven staff members from the Department of Computer Science at the eMalahleni Campus who have recently received their postgraduate (5) and Advanced diplomas (2), highlights the commitment of the Department's staff to personal growth and continuous learning. It is also a powerful example for students and the broader community, demonstrating that education is a lifelong and fashionable pursuit.

Two of the staff members graduated with advance diplomas at the eMalahleni Campus and the other five received postgraduate diplomas at the Soshanguve Campus. The cohort of graduated staff members included lecturers, researchers and administrative personnel, all of whom balanced their demanding work schedules with rigorous academic studies to achieve their qualifications.

Senyeki Marebane, Academic Manager at the Department said: "The Department is deliberate in what it does and has a solid plan to build its own timber. In the past, we have struggled a lot to attract suitably qualified personnel, hence we resolved to put a plan in place to develop the talent among us. Although it takes time, it is worth the investment."

He added that he is fortunate and excited to lead a team of enthusiastic staff members who are committed to academic excellence, research and innovation. "They all have an outstanding connection with the students, which ensures a quality student experience that can culminate in academic excellence."

"Embracing academic excellence is a lifestyle that opens doors to creative possibilities and limitless opportunities. The journey required a lot of sacrifice and focus, but it is known that greatness is not just an achievement, it is the daily experience of living a purposeful life. We hope to inspire greatness in our students, showing them that achieving academic excellence is possible," said Virginia Mokele, part-time lecturer at the eMalahleni Campus.

Potego Kgaphola, also a part-time lecturer at the eMalahleni Campus, added that everyone at the Department strives to bring out the best in their students. "Moments like these are highly rewarding since they signify victories for us as well as our students who draw inspiration from their lecturers' example. They become more engaged in their studies because they see the value of education through interactions with and learning from us daily. We are committed to developing both ourselves and our students because we believe that by working together, we can create a brighter future and address Africa's challenges," he said.

The success of the Department of Computer Science employees also aligns with TUT's broader strategic goals of fostering a culture of continuous improvement and academic excellence.

ICT students turn data into innovative project at

IBM Z DATATHON

In an era where artificial intelligence (AI) reigns supreme and data stands as the heartbeat of innovation, driving transformative solutions to pressing social challenges. Recognising the immense potential of data science, the 2024 IBM Z Datathon emerged as a dynamic platform aimed at empowering participants to leverage technology for meaningful impact.

Hosted by the Faculty of Information and Communication Technology (FoICT), this exciting international event took place at the Soshanguve South campus, through the assistance of Vuyisile Memani, Computer Science Lecturer.

The IBM Z Datathon is more than just a competition; it embodies collaboration and creativity in problem-solving. Participants, organized into diverse teams, utilised data science resources to devise practical solutions in a high-energy environment. The emphasis was on teamwork and the rapid development of innovative ideas, showcasing how data can be harnessed to tackle real-world challenges.

This year's event drew participation from a wide range of universities across South Africa, including:

- Tshwane University of Technology (TUT) – all three campuses
- Vaal University of Technology (VUT)
- Mangosuthu University of Technology (MUT)University of Fort Hare (UFH)
- Walter Sisulu University (WSU)
- University of the Witwatersrand (WITS)
- Sefako Makgatho University (SMU)

With more than 9 000 registrations across 39 countries and over 320 final projects submitted, South Africa managed to be part of the 13 winning teams selected, with a team from the ICT Faculty's Computer Science Department taking the second prize for South Africa. The team TUT 36 (Data Team) took on the problem of billions of people lacking access to quality care. They used image processing capabilities and a model to analyse X-ray images of the lungs and identify healthy versus unhealthy lungs. The project has the opportunity to scale for other diseases analysis and prediction.

The diverse backgrounds and perspectives of the participants created a lively atmosphere, fostering innovation and collaboration among budding data scientists. The IBM Z Datathon represents a significant step forward in the use of data science across Africa.

By engaging students in hands-on experiences, the event not only helps cultivate essential skills but also aims to inspire the next generation of data scientists to pursue careers in this vital field. The collaborative spirit of the Datathon encourages participants to network, share ideas and learn from one another, all while working toward a common goal.

As the world becomes increasingly interconnected and data-driven, events like the IBM Z Datathon are crucial in shaping the future of technology and innovation in Africa. By empowering students to harness the power of data, a way is paved for groundbreaking solutions that address the continent's most pressing social challenges. The success of this year's event once again highlighted the potential of young minds coming together to create a better tomorrow.

Cyberbullying and cybersecurity awareness:
TUT outreach programme aims to promote vigilance

In today's increasingly interconnected world, the digital landscape can often resemble a vast and complex jungle. As such, it is imperative for young people to remain vigilant and well-informed about the growing concerns surrounding cybersecurity and cyberbullying.

This critical message formed the foundation of a recent outreach program designed to engage learners directly with the challenges of digital safety. The initiative aimed to equip young individuals with the knowledge and tools necessary to navigate the digital realm securely and responsibly.

Through interactive sessions and expert guidance, the program emphasised the importance of understanding potential threats, recognising the signs of cyberbullying and adopting proactive measures to safeguard personal information online. By fostering a culture of awareness and resilience, the outreach initiative sought to empower the next generation to thrive in the digital age while mitigating risks associated with the ever-evolving cyberspace.

The programme's focus on cybersecurity and cyberbullying underscores a broader commitment to creating a safer, more informed digital environment for all.

The Faculty of Information and Communication Technology (FoICT) partnered with Mapenane School of Specialization and Edendale High School, in hosting this innovative event.

During the programme, interactive presentations and engaging activities equipped learners to develop a robust understanding of the importance of protecting their digital identities. The education highlighted the diverse range of online threats, with a particular focus on recognising and responding to cyberbullying. Real-world examples and case studies, opened learners' eyes, giving them a deeper insight into the potential risks and consequences associated with cyberbullying.

Prof Topside Mathonsi, HoD of FoICT's Department of Information Technology and a key contributor to the programme, emphasised the significance of sharing information with learners to help them become responsible digital citizens. "By equipping learners with the knowledge and skills to navigate the complexities of the digital landscape, this outreach programme will empower them to make informed decisions and take proactive steps to protect themselves and others," he said.

In addition to creating awareness, the programme encouraged learners to foster a positive online environment, support their peers, report cyberbullying as well as practice empathy and kindness in their digital interactions. These efforts are essential to create a digital space conducive to mutual respect and understanding.

Dr Solly Maswikaneng, an IT lecturer and contributor to the outreach, highlighted the importance of collaboration between individuals, educational institutions, technology companies and policymakers to create safer online spaces and combating cyberbullying.

"Cyberbullying is a pervasive challenge requiring a multi-stakeholder approach. Prioritising prevention, timely intervention and victim support, would be key in mitigating the harmful effects of cyberbullying and fostering a more respectful digital culture," Dr Maswikaneng concluded.

ICT FACULTY MARKETER
takes her qualifications to the next level

Thembeka Manetje's journey from a small town in North West to becoming a Faculty Marketer at the Tshwane University of Technology (TUT) is nothing short of inspiring. With a passion for marketing that began during her university years, she excelled academically while also making significant contributions to research in the field of Digital Out-of-Home (DOOH) advertising. Today, Dr Manetje is a shining example of dedication, resilience and intellectual curiosity.

Born in Mothutlung, a town in the North West Province, Thembeka matriculated in 2009 at Die Hoërskool Wonderboom as deputy head girl. Even in her high school years, she showed leadership, participating in extracurricular activities like drama, netball and athletics. However, as she embarked on her university career at the Tshwane University of Technology in 2010, her focus slowly shifted toward academics. "The passion for non-academic activities started to fade and I became more focused on my studies," she reflects. "Though I still played netball for the University, academics had become my primary focus."

Her dedication paid off as she completed her B-tech and Master's degrees in Marketing with Cum Laude. However, it wasn't a predetermined desire for a PhD that led her to pursue further study; rather, it was an intense passion for marketing. "I didn't set out to do a PhD, but my eagerness to learn more about marketing led me to pursue it," she says. "The desire to continuously deepen my understanding of marketing motivated me to take that next step in my academic journey."

Like many academic professionals, Dr Manetje's journey was not without challenges. One of the most difficult aspects was managing her work commitments, her PhD studies and being a dedicated mother to two young boys. "The balancing act between work, my PhD studies and motherhood was tricky," she admits. "I had to set a schedule and stick to it. Spending time with my family was as important to me as completing my PhD and performing well at work."

Through careful time management and a strong support system, she was able to successfully navigate these challenges and complete her studies while maintaining a meaningful personal life.

Dr Manetje's PhD research explored an area of advertising that is gaining traction worldwide—Digital Out-of-Home (DOOH) advertising. Specifically, her thesis focused on assessing the effectiveness of advertising on digital boards at minibus taxi ranks by evaluating commuters' recall of the brands that are advertised.

"I chose this research sphere because I saw a gap," she explains.

"While previous studies had explored consumers' behaviours to DOOH advertising in locations like point-of-sale or point-of-wait environments, the impact of digital boards at point-of-transit locations, such as minibus taxi ranks, had been largely neglected. These environments provide a unique opportunity to target key decision-makers of household purchases—commuters—who can be effectively reached through attention-grabbing, video-format digital boards."

Her work in this area is groundbreaking in South Africa, where DOOH advertising is still relatively new. Dr Manetje's research promises to open up new avenues for marketers seeking to understand how digital platforms can engage consumers in non-traditional spaces.

Dr Manetje's academic journey has been filled with proud moments. One of the most memorable milestones was when she received the news in 2020 that she had been accepted into the PhD program. Another unforgettable moment came after her doctoral defence, when she received feedback from the panel that she had passed.

"It was a proud moment for me, especially seeing my supervisors—Prof.Thérèse Roux and Dr Elizma Wannenburg—smiling after my presentation. I knew then that I had made them proud."

Additionally, the opportunity to publish in top international journals alongside her supervisors was another highlight of her PhD experience.

Looking ahead, Dr Manetje is eager to continue her research into DOOH advertising, particularly in the South African context. “I want to contribute more articles to expand the knowledge base for researchers who will follow in my footsteps,” she says. “DOOH advertising in South Africa is a fairly new medium and it has received little attention. I hope my work will help future researchers better understand its potential.”

Her commitment to advancing the field underscores her deep passion for marketing and her belief in the transformative power of research.

When asked what advice she would give to students who are considering pursuing advanced degrees in marketing or ICT, Dr Manetje shares valuable insights:

“Choose a topic that you are passionate about,” she advises. “You’ll be spending a significant amount of time researching and studying that topic, so it is important to pick something that excites you. Having a keen interest in your research will make the process more enjoyable and rewarding.”

Dr Thembeka Manetje’s journey is a testament to the power of passion, determination and hard work. From her humble beginnings in Mothutlung to her groundbreaking research in DOOH advertising, she continues to inspire those around her. Her dedication to her academic career and her family, along with her drive to contribute to the field of marketing, is a powerful example of what can be achieved through resilience and a love for learning.

Bontle Moloi: Ekurhuleni tech star rises to industry recognition

A 24-year-old tech enthusiast from Ekurhuleni, Bontle Moloi, is making strides in the tech industry. Currently studying for a Diploma in Computer Science at TUT, Bontle’s journey in Information and Communication Technology (ICT) showcases early potential and dedication to learning and growth.

A crucial moment in Bontle’s journey was attending the Women in AI Southern Africa event online, where she connected with Shameera Akbar, a tech entrepreneur who introduced her to the cybersecurity field. This connection led to her nomination for BCX’s Wired4Women awards on 22 May 2024 at the Houghton Hotel, Johannesburg.

Bontle’s nomination for a tech award reflects her budding contributions to the industry and her solid academic efforts. Inspired by a tech entrepreneur she met through hackathons and tech initiatives, Bontle applied for the nomination. Her developing resume, including roles such as Microsoft Student Ambassador, Cybersafe Trainee and Creative Assistant for the Hacker Society committee, underscored her enthusiasm and commitment.

Despite being a diploma student, her nomination alongside more advanced students highlightedher potential and dedication. As a Microsoft student ambassador and a member of the ICT Faculty’s Girls in Tech, Bontle regularly engages with Microsoft’s products and shares her knowledge through workshops, aiming to support her peers and the broader community.

Bontle Moloi’s story is one of early promise and dedicated effort. As she continues her studies at TUT and pursues further opportunities, this is a young talent to watch in the tech world. Her journey from Ekurhuleni to being recognised in the tech community serves as an inspiration for aspiring tech enthusiasts.

NRF C3 rated TUT researchers wins international

Best Presenter Award for Machine Learning in Education

Dr Robert Hans, Head of the Department of Computer Science at the Tshwane University of Technology's Soshanguve Campus, who recently received an NRF C3 rating, has added another prestigious achievement to his success. He received the Best Presenter Award for his thought-provoking paper titled A Comparative Study of Supervised Machine Learning Algorithms for Student Study Prediction at the 3rd International Conference on Data Science and Emerging Technologies. The event took place in Kuala Lumpur, Malaysia, on 12 & 13 December 2024, at UNITAR International University, a pioneer institution renowned for its virtual learning model.

The paper, which explored the efficiency of various machine learning algorithms in predicting student likelihood of engaging in a studying activity, garnered significant attention for its intriguing approach and potential impact on educational technologies. Dr Hans' research seeks to harness the power of data to enhance student learning experiences and outcomes, making it highly relevant in today's tech-driven academic environment.

As educational institutions around the world seek to innovate and improve learning outcomes, Dr Hans' work offers valuable insights into how technology can be leveraged to create a more personalised and data-driven approach to education. His award-winning presentation has highlighted his position as a thought leader in the intersection of machine learning and education, paving the way for future breakthroughs that could transform how we approach student success.

Congratulations to Dr Robert Hans on this remarkable achievement, which further affirms the Faculty of ICT's role in advancing knowledge and shaping the future of technology and education.

MODERNISING TECHNOLOGIES:

insights from Prof Pius Owolawi at SETA Skills Summit

The 2024 SETA Skills Summit (SSS), themed Together, Skilling the Nation, hosted by the Association of Sector Education and Training Authority (SETA) Chairpersons and the SETA CEOs Forum, saw the launch of the SETA Integrated High Impact Programmes. The two-day summit, during which Prof Pius Owolawi, TUT's Head of the Department of Computer Systems Engineering and MICTSETA 4IR Research Chair, shared his views on modernising technologies within the context of developments, trends, patterns and skills needed in various economic sectors, also featured rigorous dialogue aimed at strengthening, promoting and showcasing the integrated work of SETAs within the skills development sector.

The Summit provided an opportunity for the sector to reflect on the execution of its skills development mandate, based on the findings of the Department of Higher Education (DHET) Mid-term Review and to set a strategic trajectory for the next five years (2025-2030).

It also aimed to foster strong partnerships and collaboration among all SETAs, emphasising the importance of integrated SETA communication to disseminate uniform messages to the broader South African community, facilitating impactful collaboration of SETA operations on significant programmes and projects, as well as identifying key trends across economic sectors to support stakeholders through skills migration and forecasting the SETA role beyond 2030.

The (former) Minister of Higher Education and Training, Science and Innovation, Dr Blade Nzimande, delivered the keynote address, highlighting key insights and initiatives within the skills development and training fraternity.

In his presentation, Prof Owolawi said modernising technology across various sectors involves staying abreast of the latest developments and trends, as well as acquiring the requisite skills to leverage emerging technologies effectively.

He added that embracing innovation and investing in talent development can position organisations for sustainable growth and competitive advantage in today's digital era.

Prof Owolawi discussed key developments including the integration of AI, machine learning and cybersecurity in IT; telemedicine and wearable tech in healthcare; and precision agriculture and smart farming in agriculture. He stressed the importance of acquiring new skills such as data analysis, programming and understanding of IoT to meet the evolving demands of these sectors.

"SETAs as well as other educational and policy bodies can better prepare South Africa's workforce for the challenges and opportunities of a rapidly evolving technological landscape," Prof Owolawi concluded.

TUT GenAI researchers

WIN BEST PAPER AWARD

Two lecturers from FoICT, Dr Michael Moeti, Academic Manager at the Polokwane Campus and Relebogile Langa, PhD candidate and lecturer at the Department of Computer Science, have won the Best Paper Award during the 12th International Conference on Frontiers of Intelligent Computing: Theory and Applications (FICTA-2024), organised by AI and Data Science Research Group, London Metropolitan University, in London, United Kingdom.

The award winning paper is titled: Personalized Learning with Generative AI: Revolutionizing Learning Management Systems. Their innovative research on the limitations of current Learning Management Systems (LMSs) and the potential of Generative Artificial Intelligence (GenAI) to revolutionise personalised learning is making a significant impact in the educational field. The two scholars are pushing the boundaries of how education can be delivered.

Dr Moeti is a dedicated supervisor and an award-winning researcher driven by a singular mission - to ensure students succeed in their studies with sufficient knowledge and expertise. Langa is a PhD candidate and lecturer at the Department of Computer Science.

"It inspires me to be a professional lecturer and one of my personal goals is to see students succeed in their studies with sufficient knowledge and expertise. This passion led me to explore the ways in which LMSs could better accommodate the diverse learning styles and needs of students, particularly those with disabilities. An impactful discovery was that students learn best when they find learning personal and fun," said Langa.

"I was intrigued and excited by the potential of exploring personalised learning in LMSs, recognising the significant impact it could have on student engagement and success. Together, we have made several significant discoveries. The most obvious discovery was that these students are not equal in terms of their capabilities to learn, therefore this proposed revolutionising Learning Management Systems will cater for all types of students according to their preferred ways of learning," added Dr Moeti.

According to them, their paper's most significant contributions are its innovative approach to personalising learning experiences and its comprehensive framework for integrating adaptive technologies into existing LMSs. Langa and Dr Moeti guided the research by emphasising the importance of designing flexible and inclusive systems.

"We focused on creating adaptive learning paths and incorporating assistive technologies to ensure accessibility for all students," said Dr Moeti.

Langa proposed the use of Generative AI to achieve personalised learning. "Unlike other AI technologies used in education, GenAI's capabilities extend beyond content generation. It can also understand how students learn and perform, provide real-time feedback and grade assessments with explanations. This makes GenAI a more versatile and cost-effective solution for creating adaptive learning environments. Generative AI would not demand as much as other technologies in terms of costs. Its capabilities extend beyond just generating content, but also in understanding insights of how students learn and perform," Langa elaborated.

Generative AI holds immense potential to revolutionise education by providing more dynamic, personalised, and interactive learning experiences than existing AI technologies. The potential of GenAI to transform online education is immense, particularly for students marginalised by traditional, one-size-fits-all approaches.

Dr Moeti highlighted the challenges of integrating GenAI into existing LMSs. "The primary challenges include technical integration, data privacy and ensuring equitable access. I recommend a phased implementation strategy, robust data protection measures and ongoing collaboration with stakeholders to address these challenges effectively," he said.

Looking ahead, Langa and Dr Moeti are excited to continue their research on GenAI in education. They aim to apply their proposed integration model gradually, enhancing engagement in online classes through real-time generated questions based on meeting transcripts.

Relebogile Langa

Dr Michael Moeti

TUT hosts Japanese academic leader *in expanding horizons*

TUT's Technology Station in Electronics and Prof Takahashi Motoki, prominent academic representative from Kyoto University in Japan, met at the CSIR on 26 August 2024 to strengthen a long-standing partnership between TUT and Japanese universities and other organisations. Prof Motoki represented the interests of several Japanese universities. This partnership has been instrumental in facilitating academic exchanges and collaborative projects, with the meeting aiming to further enhance these ties.

The meeting featured a comprehensive agenda designed to showcase and expand upon the collaborative efforts between TUT and Japanese institutions. The session kicked off with Dr Etienne Van Wyk, Faculty of ICT Executive Dean's welcome address and presentation providing an overview of TUT's achievements and strategic goals.

Following this, Prof Motoki delivered a presentation on the current landscape and future directions of Japanese-South African academic exchanges. Prof Motoki, who has played a crucial role in arranging various Memoranda of Understanding (MOUs) between TUT and several Japanese universities, shared valuable insights into the ongoing and future collaborations.

The event included presentations from TUT's Faculty of Arts and Design, Faculty of Engineering and the Built Environment, as well as the Faculty of Information and Communication Technology. These highlighted the contributions and successes of the faculties, demonstrating the depth and breadth of TUT's academic programmes and their impact on international collaboration.

The meeting concluded with Prof Joey Jansen van Vuuren from the Department of Computer Science's closing remarks, reflecting on the discussions and outlining the next steps for strengthening the partnership.

The partnership represents a significant opportunity for TUT to enhance their collaborative efforts with Japanese institutions.

AI Expo Africa 2024:
Navigating the intersection of AI, Cybersecurity and innovation

AI Expo Africa, the largest AI-focused event in Africa that annually brings together distinguished innovators, business leaders and tech experts this year illuminated the latest advancements in Artificial Intelligence (AI), Robotic Process Automation (RPA) and other emerging technologies.

The 2024 event provided a deep dive into AI's role in transforming sectors such as healthcare, finance and agriculture, while also offering opportunities for professionals to network and collaborate.

AI Expo Africa has become an important platform for showcasing AI-driven solutions, sharing knowledge and forging partnerships across industries.

Prof Topside Mathonsi, Associate Professor from the Faculty of Information and Communication Technology, joined the event as a panellist and speaker, contributing to important conversations about AI's impact on business, governance and cybersecurity.

A major highlight of the event was the panel discussion on AI, security and privacy. As AI adoption grows, so does the complexity of managing risks related to data security and privacy. Prof Mathonsi participated in discussions about the difficulties businesses face when balancing innovation with robust security measures.

"As AI technologies evolve, the need for adaptive policies and regulatory frameworks that address emerging threats has never been more urgent," he said.

In addition to his panel participation, Prof Mathonsi delivered a presentation on "The Impact of Generative AI on Cybersecurity: Fighting Machines with Machines", exploring the dual-edged nature of generative AI. According to him it offers tremendous potential for innovation, but also creates new opportunities for cybercriminals. AI-generated attacks, such as deepfakes and automated phishing schemes, become more sophisticated daily, making them harder to detect and counter.

Prof Mathonsi also discussed the use of AI in defence. "AI-powered cybersecurity tools, such as advanced threat hunting and automated incident response, can help organisations identify and mitigate threats faster than traditional methods. However, as AI continues to evolve, organisations must not drop their guard. They should continuously update their defences," he added.

According to Prof Mathonsi the conversations highlighted the importance of cross-sector collaboration to address the complex challenges AI poses, especially in terms of security and privacy.

"AI's rapid advancement demands a unified approach to ensure it is deployed ethically and responsibly, with a focus on protecting sensitive data," he concluded.

Faculty of ICT hosts
3rd Annual Programming Fest

The Faculty of ICT buzzed with excitement as the Programming Fest 2024 kicked off, bringing together keen coders, tech enthusiasts and industry experts for a celebration of programming excellence. This year's event, held at TUT's eMalahleni Campus on 31 July 2024, promised to be a dynamic showcase of creativity, skill and collaboration in the ever-evolving field of computer science.

The Programming Fest concept was established in 2022 for all programming students at TUT' s eMalahleni Campus. The primary objective of the event is to extend invitations to programming professionals and other relevant stakeholders to come and talk to the students with the intention of inspiring them and encouraging their enthusiasm for programming.

Programming Fest 2024 was a vibrant community gathering that highlighted the latest advancements in technology and programming. Attendees had the chance to participate in a variety of events, including workshops, and keynote presentations by leading figures in the tech world. These activities are designed to not only challenge participants but also to inspire them and expand their horizons.

The Programming Fest featured several key components that catered to a wide range of interests and skill levels. A series of hands-on workshops offered deep dives into various programming languages, tools, technologies and a range of human resources, industrial relations, personal branding and financial skills. These sessions were led by experienced professionals who shared their insights and practical knowledge, providing valuable learning opportunities for both novice and experienced coders.

Industry leaders and tech visionaries delivered keynote addresses, sharing their perspectives on emerging trends, future technologies and the impact of programming on various sectors. These talks were designed to motivate and educate attendees about the broader implications of their work.

"Programming Fest offers ample opportunities for participants to network with peers, mentors and potential employers. This interaction fosters professional growth and collaboration, creating connections that could lead to future projects or career opportunities. One of the core objectives of the Programming Fest is to empower the next generation of programmers and tech innovators emerging through the Computer Science Extended Provision curriculum," said Senyeki Marebane, an academic manager at the eMalahleni Campus.

By providing a platform for young talents to demonstrate their skills and creativity, the fest encourages participants to think creatively and explore new possibilities in programming. This focus on nurturing emerging talent is essential for driving the future of technology and ensuring a continuous flow of fresh ideas and solutions.

Senyeki added: "This year's Programming Fest included an induction component for Work Integrated Learning students through presentations by industry experts and an awards ceremony to celebrate outstanding achievements. Prizes were awarded to programming students who cruise through this journey, which is wrongly characterised as turbulent and challenging, in recognition of satisfactory performance in programming subjects and other notable contributions. Prizes were sponsored by AfriCoal."

Programming Fest is a landmark event that brings together the brightest minds in technology to push boundaries, share knowledge and inspire future innovations. Whether you are a seasoned programmer or a curious newcomer, programming fest offers an unparalleled opportunity to engage with the vibrant world of coding and contribute to the advancement of technology.

FoICT contributes to Coding and Robotics Curriculum *in strengthening education*

A long-standing collaboration between the Department of Basic Education (DBE), the Department of Higher Education and Training (DHET) and the Tshwane University of Technology's (TUT) Faculty of Information and Communication Technology's (FoICT) Department of Computer Science, has been instrumental in enhancing the quality of education through various initiatives. These include workshops as well as planning and training sessions designed to benefit experts and participants from Higher Education Institutions (HEI). Due to this collaboration, the Department of Basic Education (DBE) invited FoICT to participate in the training of foundation phase for provincial and district officials on coding and robotics.

In 2023, two experienced staff members from the Department of Computer Science, Aubrey Khoza and Dr Bertie Buitendag, were also invited to become part of the process of reworking and strengthening the Draft Curriculum and Assessment Policy Statement for Coding and Robotics. Their involvement focused on the foundation, intermediate and senior phases of the CAPS documents.

Because of their previous engagements with the DBE on various educational projects they were the ideal candidates for this important task. Both individuals view such opportunities as excellent avenues for community service, allowing them to give back to the educational community and contribute to the development of future generations.

The rigorous and detailed process of strengthening and reworking the CAPS documents was to ensure that the curriculum was robust, comprehensive and aligned with the latest educational standards and industry requirements. This involved reviewing the existing drafts, identifying areas for improvement and incorporating feedback from various stakeholders.

Khoza and Dr Buitendag, with the support of Research Professor, Joey Jansen Van Vuuren and the HoD for Computer Science, Dr Robert Hans, worked closely with other members of the curriculum strengthening team, drawing on their extensive experience in computer science education to provide valuable insights and make recommendations.

Their contributions were critical in shaping a curriculum that would not only meet the educational needs of students but also prepare them for the challenges and opportunities of the digital age.

This culminated in the successful resubmission of the revised CAPS documents to Umalusi, the Council for Quality Assurance in General and Further Education and Training. Umalusi approved all three CAPS documents, marking a significant achievement for the Faculty of ICT's Department of Computer Science and its partners.

The approval of the revised CAPS documents is a testament to the hard work and dedication of all involved. It signifies a major step forward in the implementation of a modern, effective Coding and Robotics Curriculum in South African schools. This curriculum will equip students with essential skills in coding and robotics, fostering critical thinking, problem-solving abilities and digital literacy from an early age.

As the newly approved curriculum is rolled out, it promises to have a lasting positive impact on the education system and the future of students across the country.

FOICT ENTREPRENEURIAL EXPO DAY

highlights innovative student projects

This dynamic event, held at the Soshanguve South Campus, aimed at fostering industry connections, promoting the Faculty's offerings and encouraging student entrepreneurship highlighted the innovative projects of final-year students.

The primary objective of FEED is to exhibit the cutting-edge projects developed by final-year ICT students. These projects, displayed to a host of industry partners, underscored the technical prowess and creativity of the students.

Vuyisile Memani, Computer Science lecturer and coordinator of the event, explained the importance of such exhibitions. "We aim to share the ICT skills of our students with the captains of industry and promote entrepreneurship among students," Memani said.

He added, "We believe our students are adequately technically skilled to start their own businesses. Because of the technical skills with which they are capacitated, our graduates can make an immediate impact in the workplace."

Beyond showcasing student projects, FEED also serves as an outreach initiative to grade 12 learners from nearby areas. By promoting the Faculty's courses, TUT aims to inspire learners to pursue careers in ICT, demonstrating the diverse opportunities and potential within the field.

The promotion of entrepreneurship among ICT students was a significant theme during FEED.

By encouraging students to think beyond traditional employment and consider starting their own ventures, TUT aims to cultivate a generation of innovative, business-minded graduates. This focus on entrepreneurship is particularly pertinent in the ICT field, where rapid technological advancement continually opens new avenues for creative and disruptive business ideas.

The participation of numerous organisations in the ICT sector enhanced the success of FEED. These included SOFT KINGS, Geeks4Learning, BBD, GEEKULCHA, Fluid Intellect, Celerity Holdings, RMCERI, PSIRA, CSIR and STANDARD BANK. These industry partners not only observed the projects but also interacted with the students, providing valuable feedback, potential mentorship and networking opportunities. Their presence underscored the event's significance and the high regard in which TUT's ICT Faculty is held within the industry.

FEED clearly demonstrates TUT's commitment to providing relevant and impactful education. The qualifications offered by FoICT are designed to empower students, enabling them to make significant contributions to society. By combining technical skills development with entrepreneurial training, TUT ensures that its graduates are well-equipped to navigate and lead in the ever-evolving ICT industry landscape.

Mpumalanga Artificial Intelligence Student Hackathon

BRINGS OUT BEST IN ICT STUDENTS

The Mpumalanga Artificial Intelligence Students Hackathon (MAISH) once again brought out the best in aspiring tech innovators who convened for a weekend of creativity and collaboration at the University of Mpumalanga. The 2024 event showcased the talent and potential of young minds eager to tackle real-world challenges using technology.

The hackathon, hosted by the Faculty of Information and Communication Technology (FoICT) in partnership with the University of Mpumalanga, drew participants from across the region. Students formed teams to brainstorm and develop innovative solutions. The event fostered a spirit of competition and camaraderie, encouraging participants to push their boundaries and think outside the box.

MAISH is not just a contest; it is a unique learning experience. Teams had the opportunity to gain hands-on experience, enhance their skills and receive guidance from industry professionals and mentors. This connection with experts in the field allowed participants to gain valuable insights into the practical applications of their ideas, potentially paving the way for their solutions to be implemented in real-world scenarios.

The success of the Hackathon was made possible by the generous support of key sponsors, including Nedbank, NITheCS, Ndende Technologies, BoxFusion and UCDP from UMP. Their commitment to fostering innovation among young people assisted in creating an environment where creativity could flourish.

Both UMP and TUT played crucial roles in organising and executing the event, demonstrating their dedication to empowering students and promoting technological advancement in the region.

First place went to Agri-Smart Solutions for their AI-powered tool, Farm Guard, which assists farmers in effectively identifying and managing pests and diseases. This innovation enables farmers to safeguard their crops, boost productivity and lower costs by utilizing data-driven insights.

As the weekend ended, participants left with new skills and knowledge as well as lasting connections with fellow innovators and industry professionals. Building on the 2023 event, the 2nd annual MAISH was a remarkable celebration of talent, collaboration and the limitless possibilities of artificial intelligence.

TECHNOLOGY INNOVATIONS IN FARMING SHARED

with adopted schools of specialisation

The Faculty of ICT introduced learners at two focus schools to smart farming and intelligent systems, which are important in today's technology driven world.

The Mapenane and Sikhululekile Schools of Specialisation have been adopted by TUT's Faculty of ICT as part of its outreach programme to empower learners with new technology skills.

Through the programme, learners are immersed in the applications of Internet of Things (IoT,) technology within agriculture and other industries. By exploring how intelligent systems can enhance productivity and efficiency, learners gain a comprehensive understanding of emerging technologies.

Central to the outreach effort is a hands-on learning approach. Learners engage in practical projects designed to cultivate essential skills such as data collection, analysis, machine learning, interpretation and programming.

The approach not only reinforces theoretical knowledge, but also equips learners with the competencies needed to navigate the complexities of modern technology.

The significance of the outreach programme extends beyond the classroom. By working on real-world applications of IoT in smart farming, learners can envision and develop innovative solutions that address agricultural challenges and other industry needs. The practical experience prepares them to become contributors to the advancement of intelligent systems across various sectors.

Overall, the outreach programme successfully equipped learners with introductory knowledge and skills necessary to thrive in the evolving landscape of technology. By fostering an understanding of smart farms and intelligent systems, TUT is nurturing the next generation of innovators who will drive progress in these dynamic fields.

Teams collaborate to find ground-breaking solutions at

6th Annual Tshwane Varsity Hackathon

The City of Tshwane and the Tshwane University of Technology's Faculty of ICT proudly hosted the 6th Annual Tshwane Varsity Hackathon. This year's event brought together a diverse group of participants, including hackers, industry coaches, sponsors and esteemed judges, all united in their mission to innovate and tackle real-world challenges.

The event, held on 18 - 20 October 2024, was attended by Dr Nasiphi Moya, the Executive Mayor of the City of Tshwane, who underscored the importance of youth innovation in shaping the future of the city.

"This platform is a true reflection of the innovation and determination of our youth. To all the participants, your ideas and solutions are shaping the future of our city and beyond. Keep pushing boundaries, stay focused and never stop learning. You are the driving force behind tomorrow's breakthroughs. The City of Tshwane will certainly need your innovative ideas if it is to compete globally as a smart city," she remarked.

Elesa Ntuli, the 2024 Chief Organiser of the Hackathon, along with the dedicated organising team, ensured the event ran smoothly. A special mention goes to the lead-team organisers whose hard work and commitment were instrumental in creating a conducive environment for innovation and creativity.

The Hackathon showcased the collaborative spirit of the University Hackathon Series, spearheaded by Mashitishi Phurutsi from TUT's Faculty of ICT. Phurutsi highlighted the significance of Hackathons in today's educational landscape.

"A Hackathon as a playground is a beneficial festival to practice design science and perform under pressure. It is an opportunity to enhance digital skills for the future of work," he said.

The success of the Hackathon was made possible by the generous support of numerous partners and sponsors, including Agile Alliance, Nelekat, FaethM, the University of Pretoria (UP), Switch Energy Drink, Sefako Makgatho Health Sciences University (SMU), IQ Business, ThinkTank, and AWS Academy. Their contributions underscored the importance of collaboration between academia and industry in addressing skills gaps and fostering innovation.

Lecturers, tutors, student mentors and University staff played a crucial role in guiding participants throughout the event, while academics from SMU, UP and the University of South Africa enriched the experience with their expertise and insights. The involvement of industry coaches and mentors provided invaluable guidance, ensuring that participants were well-equipped to tackle the challenges presented.

At the prize-giving ceremony that took place on 1 November, Dr Vathiswa Papu-Zamxaka, Deputy Vice-Chancellor for Research, Innovation and Engagement at TUT said the Hackathon was aligned with TUT's strategic pillars. She said TUT aims to prepare future-ready graduates who make societal impact through research, innovation, engagement and technology transfer to foster growth, development and sustainability.

The 6th Annual Tshwane Varsity Hackathon was more than just a competition; it was a celebration of the spirit of innovation, determination and collaboration that defines youth.

Innovation unleashed at the third annual Limpopo Varsity Hackathon

The Limpopo Varsity Hackathon (LVH) brought together students from three universities for an inspiring three days focused on the theme "Artificial Intelligence of Things (AIoT) and its potential to enhance efficiency and sustainability across various sectors".

The hackathon, now in its third year, was attended by students from Tshwane University of Technology (TUT), University of Venda (Univen) and University of Limpopo.

It showcased the collaborative spirit of the University Hackathon Series, which is led by Mashitishi Phurutsi, Head of the Department for the Faculty of ICT's First Year and Foundation Unit.

Participants were encouraged to explore the applications of AIoT in critical domains including health, food security, waste management, education and water preservation. The diverse range of topics aimed to tackle pressing societal issues, fostering innovative solutions among students.

Key sponsors supporting this year's hackathon included Lepelle Northern Water, My Tech, Nelekat, ILOVEWHATIDO, Agile Alliance, AWS Academy, Faethm and First National Bank (FNB). The support from sponsors demonstrated strong backing from the tech industry for educational initiatives and innovation.

The hackathon kicked off with an inspiring welcome note from Dr S Moyo, Head of the Department for Mathematics and Computational Sciences at Univen. He emphasised the importance of interdisciplinary collaboration in addressing contemporary challenges through technology. Following his address, Senyeki Marebane, Academic Manager for Computer Science at TUT, provided words of encouragement, reinforcing the University's commitment to fostering a culture of innovation within the ICT Faculty.

After two intense days of brainstorming, coding and collaboration, the event culminated in a thrilling presentation session.

The standout project, HerdAware, developed by a talented group of participants, captured the judges' attention with its advanced technology for livestock tracking and monitoring. This innovative solution not only showcased the potential of AIoT in agriculture, but also highlighted how technology can drive efficiency in farming practices.

In his closing remarks, Phurutsi, acknowledged the creativity and hard work displayed by all participants. He reiterated the importance of initiatives such as the LVH in nurturing young minds and encouraging future leaders in technology.

HEADCOUNT ENROLMENTS

by Department by Qualification Type

Department	Undergraduate	Postgraduate Diplomas	Masters	Doctoral	Grand Total
Computer Science	3 597	62	29	10	**3 698**
Computer Systems Engineering	930	29	28	15	**1 002**
Informatics	1 283	83	37	9	**1 412**
Information Technology	1 011	87	33	9	**1 140**
Total	**6 821**	**261**	**127**	**43**	**7 252**

2024 RESEARCH OUTPUTS

Department	Journals articles	Conference papers	Book chapters
Computer Science	7	14	2
Computer Systems Engineering	20	18	1
Informatics	10	3	1
Information Technology	3	7	2
Dean: ICT	**3**	**0**	**0**
End User Computing Unit	**1**	**1**	**0**
Total for Faculty	**44**	**43**	**6**

2024 GRADUATIONS

QUALIFICATION TYPE	YEAR: 2024
UNDERGRADUATE TOTAL	**1049**
Masters	20
Doctoral	8
Other Postgraduate	73
POSTGRADUATE TOTAL	101
GRAND TOTAL	**1150**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