INFORMATION TECHNOLOGY UNIVERSITY

unesco Chair

ACTIVITIES AND ACHIEVEMENTS

ANNUAL REPORT

March 2023 - March 2024

UNESCO

UNESCO Chair of ICTD

Prof. Dr. Adnan Noor Mian

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INTRODUCTION

Under the esteemed leadership of Prof. Dr. Adnan Noor Mian, who was awarded the UNESCO Chair of ICTD in March 2023, the Information Technology University of the Punjab embarked on numerous initiatives to advance the field of Information and Communication Technology for Development (ICTD). The following is a summary of the activities conducted during the reporting period and an overview of the main achievements and challenges faced. The report comprises the following sections.

CHAIR FOR ICTD VISION

The UNESCO Chair for Information and Communication Technology for Development (ICTD), guided by the leadership of Prof. Dr. Adnan Noor Mian, envisions advancing the boundaries of ICTD through research, collaborations, and a commitment to fostering sustainable development. With a focus on initiatives, such as the ICTD Lab, Blockchain Lab, and collaborative projects with the International Centre of Theoretical Physics (ICTP), the Chair aims to connect emerging technologies like the Internet of Things (IoT) and Machine Learning (ML) to address societal challenges. This vision is reinforced by a dedication to ethical, inclusive, and impactful technological advancements, ensuring that the UNESCO Chair for ICTD becomes a catalyst for positive change and a model for leveraging ICT in the service of humanity.

ACTIVITIES CONDUCTED

Round Table Talk on Cyber Security:

Date: August 29th, 2023 (Tuesday)

Time: 2:00 PM - 5:45 PM

Location: Information Technology University of the Punjab

PARTICIPANTS:

- Prof. Dr. Adnan Noor Mian
- Mr. Mubarak Mustafa
- Dr. Arif Mehmood
- Mr. Faheem Akhter
- Mr. Javed Zahoor
- Dr. Haroon Mahmood
- Dr. Arshad Ali
- Dr. Muhammad Umar Janjua
- Dr. Khurram Bhatti
- Dr. Zartash
- Mr. Wahaj Khan
- Mr. Khawaja Faisal Javed
- Mr. Asif Iqbal
- Mr. Adil Irfan
- Mr. Ahrar Naqvi (online)
- Dr. Hasan Islam (online)
- Dr. Umer Suleman
- Dr. Hammad Naveed

The UNESCO Chair on Information and Communication Technologies for Development (ICTD) organized a significant event, the "Table Talk on Cyber Security,". This event served as a platform for a focused and insightful discussion, bringing together a diverse group of experts and researchers in the field of cybersecurity. The primary objective was to address pressing issues and explore emerging trends in cybersecurity, fostering an exchange of knowledge and best practices among participants.

The table talk facilitated an engaging dialogue on key challenges facing the cybersecurity landscape, including evolving cyber threats, data privacy concerns, and technological advancements. Participants shared their expertise, experiences, and research findings, contributing to a comprehensive understanding of the current state of cybersecurity.

The event, held under the umbrellas of the UNESCO Chair on ICTD, played a crucial role in promoting collaboration and knowledge-sharing among stakeholders in the field. By providing a platform for experts to discuss and strategize, the Table Talk on Cyber Security aimed to contribute to the development of effective and sustainable solutions to safeguard the digital landscape.

Overall, the event reflected the UNESCO Chair's commitment to advancing knowledge, fostering dialogue, and addressing contemporary challenges in the realm of Information and Communication Technologies for Development, particularly in the critical domain of cybersecurity.

HISTORY OF SCIENCE WEEK

Introduction:

As the UNESCO Chair for Information and Communication Technologies for Development (ICTD), we are delighted to provide a summary of the activities conducted during the History of Science Week, which took place from October 2nd to October 7th, 2023. These events were thoughtfully tailored to promote an in-depth exploration of the history of science, engaging participants through a variety of intellectually stimulating activities.

List of Events

A) Guest Speakers:

The Guest Speakers session was a highlight of the History of Science Week, featuring distinguished experts who shared their profound insights on the historical evolution of science. These speakers, renowned in their respective fields, delivered captivating lectures that delved into significant scientific milestones, historical contexts, and the broader impact of scientific advancements. Their presence elevated the intellectual discourse of the week and provided participants with a unique opportunity to interact with and learn from experts in the field.

B) Declamation

The Declamation event was a platform for participants to showcase their debating skills while expressing their passion for the history of science. Participants delivered articulated speeches, narrating stories of scientific breakthroughs, the struggles of pioneering scientists, and the societal transformations brought about by scientific discoveries. This event not only enhanced participants' communication skills but also fostered a deeper appreciation for the historical narrative of science.

C) Poster Competition:

The Poster Competition added a visual dimension to the History of Science Week, allowing participants to creatively represent key moments in the history of science. Through visually compelling displays, participants conveyed the significance of scientific achievements, making complex concepts accessible to a diverse audience. This sub-activity encouraged a fusion of artistic expression and scientific knowledge, contributing to a holistic understanding of the subject.

D) Science Trivia:

The Science Trivia event brought an element of excitement and friendly competition to the week. Participants engaged in a quiz format, answering questions related to historical scientific events, discoveries, and notable figures. This interactive session not only tested participants' knowledge but also fostered a sense of companionship and enthusiasm for the history of science.

E) Movie Screenings:

Movie Screenings provided a cinematic journey into the lives of prominent scientists and the historical context of their contributions. By using film as a medium, this sub-activity reached a broader audience, making the history of science accessible and engaging. The carefully selected films enriched the overall experience, offering a unique perspective on the human stories behind scientific endeavors.

CONCLUSION

The sub-activities conducted during the History of Science Week were designed to cater to diverse interests and learning preferences, ensuring a comprehensive and enriching experience for participants. As the UNESCO Chair for ICTD, we are committed to fostering a deeper understanding of the interplay between technology, development, and the historical trajectory of science. We look forward to further opportunities to contribute to UNESCO's mission of promoting education, science, and culture worldwide.

LAUNCH OF SHORT COURSES IN INORMATION TECHNOLOGY

A series of short courses were introduced, aimed at equipping students and professionals with essential skills and knowledge in various domains of Information Technology. The following short courses are offered.

A) Python Programming with AI/ML:

This course delves into the fundamentals of Python programming while integrating key concepts of Artificial Intelligence and Machine Learning, equipping participants with versatile skills crucial for contemporary IT environments.

B) Web Development:

Focused on practical, hands-on learning, this course guides participants through the intricacies of web development, ensuring they acquire proficiency in building dynamic and responsive websites.

C) Freelancing Plus Additional Skills:

Bridging the gap between traditional employment and the gig economy, this course not only explores freelancing opportunities but also imparts additional skills necessary for success in the rapidly evolving digital marketplace.

D) MS Office (Excel & Word):

A foundational course providing in-depth training on Microsoft Excel and Word, empowering participants with advanced proficiency in these essential office tools.

E) Graphic Designing:

Participants delve into the creative realm of graphic design, acquiring skills in visual communication, layout, and design principles to create compelling and aesthetically pleasing visuals.

F) AutoCAD: Basic to Pro:

A comprehensive journey from basic concepts to advanced proficiency in AutoCAD, offering participants the skills needed for precise and efficient computer-aided design.

G) Cloud Computing – AWS Solution Architect:

Focusing on Amazon Web Services (AWS), this course prepares participants to become proficient Solution Architects in cloud computing, a crucial skill in today's technology landscape.

H) Value Investing in Stock Market:

Exploring the principles of value investing, this course equips participants with the knowledge and strategies to make informed decisions in the stock market, emphasizing long-term value creation.

I) Filmmaking- (Photography, Videography & Editing):

Covering the entire spectrum of filmmaking, from capturing visually stunning photographs to shooting compelling videos and expertly editing the final product, this course is designed for aspiring filmmakers.

CONCLUSION

These short courses reflect the UNESCO Chair on ICTD's commitment to fostering a digitally literate and skilled community. By addressing various facets of Information Technology, these courses contribute to the development of individuals, empowering them to thrive in the digital age.

EBRYX SESSION INNOVATIONS UNVEILED:

The UNESCO Chair on Information and Communication Technologies for Development (ICTD) is pleased to present a noteworthy collaboration with Ebryx, the comprehensive session conducted stands out as a significant initiative aimed at exploring and broadcasting knowledge on the latest innovations and advancements in the dynamic fields of Information Technology (IT) and cybersecurity. The collaborative session with Ebryx provided a platform for Students to gain insights into developments within the IT and cybersecurity landscape. The following key highlights showcase the depth and significance of the session:

A) Knowledge Enrichment:

The session served as a knowledge hub, providing students with a comprehensive overview of the latest innovations in IT and cybersecurity. From emerging technologies to evolving best practices, students gained valuable insights to stay at the forefront of the rapidly changing technological landscape.

B) Collaborative Learning Environment

Fostering collaboration between the UNESCO Chair on ICTD and Ebryx, the session created a conducive environment for students to engage in meaningful discussions, share ideas, and collectively explore the potential impact of innovations in the IT and cybersecurity domains.

C) Ebryx Expertise:

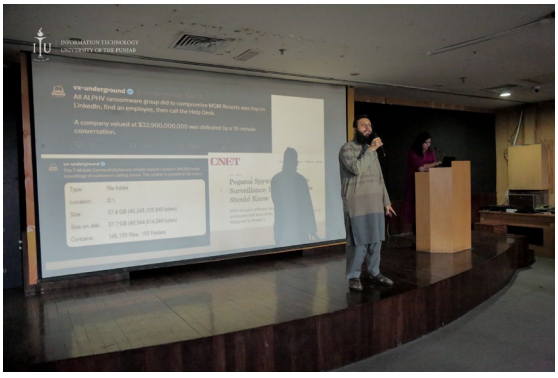
Leveraging the expertise of Ebryx, a recognized authority in cybersecurity and IT solutions, students had the unique opportunity to learn from industry leaders and subject matter experts. The collaboration brought forth real-world experiences and practical insights that are invaluable for individuals seeking to enhance their understanding of the industry.

D) Interactive Elements:

To enhance participant engagement, the session incorporated interactive elements such as live demonstrations, Q&A sessions, and discussions. These interactive components allowed participants to actively participate in the learning process and seek clarification on specific topics of interest.

CONCLUSION

The "Ebryx Session - Innovations Unveiled" represents a collaborative effort between the UNESCO Chair on ICTD and Ebryx to contribute to the knowledge enhancement of individuals within the IT and cybersecurity domains. This session aligns with the UNESCO Chair's commitment to providing a platform for continuous learning and advancements in technology.



STUDENTS FYP SESSIONS WITH EBRYX:

The UNESCO Chair on Information and Communication Technologies for Development (ICTD) is delighted to showcase a significant component of our annual report: the collaboration between students and industry experts from Ebryx through the "Students FYP Sessions with Ebryx." This initiative underscores our commitment to bridging the gap between academia and industry, providing students with valuable exposure to real-world applications and challenges in the field of Information Technology. The "Students FYP Sessions with Ebryx" served as a platform for students to interact with seasoned industry professionals, gaining insights that go beyond traditional classroom learning. The following key aspects highlight the significance and impact of this collaboration:

A) Industry-Integrated Learning:

The "Students FYP Sessions with Ebryx" served as a bridge between academic knowledge and industry practices. Students were immersed in an environment where theoretical concepts were seamlessly connected to the practical realities of the IT sector. This industry-integrated learning approach enhances students' readiness for the professional landscape they are about to enter.

B) Professional Mentorship

Through these sessions, students had direct access to experienced professionals from Ebryx, establishing a mentorship dynamic. This personalized guidance has proven invaluable in helping students navigate the complexities of their final year projects, ensuring a higher quality of work and a more comprehensive understanding of the project's relevance in real-world scenarios.

C) Collaborative Problem-Solving:

The collaborative nature of the sessions encouraged students to work closely with industry experts to address challenges relevant to their final year projects. This collaborative problem-solving approach not only strengthened the projects but also instilled in students the ability to apply critical thinking skills to real-world issues..

D) Exposure to Industry Practices:

By engaging with professionals from Ebryx, students gained insights into industry best practices, methodologies, and standards. This exposure equipped them with knowledge beyond the academic curriculum, making their final year projects more aligned with the practical demands of the Information Technology field.

CONCLUSION

The "Students Final Year Projects Sessions with Ebryx" represents a significant step in the UNESCO Chair on ICTD's mission to foster a cooperative relationship between academia and industry. This collaboration empowers students to graduate with a comprehensive understanding of the real-world applications and challenges in the IT sector, positioning them as well-rounded professionals for success in their future careers.

MEMORANDAM OF UNDERSTANDING (MOUs) WITH INDUSTRY:

The annual report for the UNESCO Chair on Information and Communication Technologies for Development (ICTD) proudly highlights nine transformative Memoranda of Understanding (MOUs) that have been established with prominent industry partners: These strategic collaborations are integral to the UNESCO Chair's commitment to bridging the gap between academia and industry, fostering knowledge exchange, and promoting innovation in the ever-evolving landscape of Information and Communication Technologies (ICT).

A) MOU with Mindstorm:

The MOU with Mindstorm represents a pivotal step in stimulating the bonds between academia and industry. This collaborative agreement lays the foundation for a partnership, encompassing both research and industry collaboration. The MOU establishes a framework for robust collaboration between the UNESCO Chair on ICTD and Mindstorm, facilitating joint initiatives that bridge academic research with real-world industry applications. A core objective of the MOU is to promote knowledge exchange, allowing both partners to benefit from each other's expertise. Academic insights are brought closer to industry challenges, while industry professionals gain access to research findings. By combining academic research capabilities with Mindstorm's industry experience, the collaboration aims to stimulate innovation within the ICT domain, fostering the development of solutions that address contemporary challenges.

B) MOU with Ebryx:

The MOU with Ebryx marks another significant milestone in strengthening the ties between academia and industry. This collaborative agreement with Ebryx is designed to foster joint initiatives in research and development, bringing together the strengths of academic expertise and industry insights. The MOU solidifies the partnership between the UNESCO Chair on ICTD and Ebryx, creating a cooperative relationship that leverages academic and industry relevance. Through this collaboration, both parties are dignified to engage in joint research initiatives, exploring emerging trends and addressing challenges in the rapidly evolving field of ICT. The MOU encourages cross-disciplinary collaboration, enabling the exchange of ideas and methodologies between academia and industry for more comprehensive and impactful outcomes.

C) MOU with Fauji Foundation:

The Information Technology University of the Punjab (ITU) has entered into a Memorandum of Understanding (MOU) with Fauji Foundation. This collaborative agreement, signed by ITU Vice Chancellor Prof. Dr. Adnan Noor Mian and Fauji Foundation's Director Human Resource and Administration, Major General Zafar ul Haq, HI(M) (Retd.), signifies cooperation in areas such as overseas and inland recruitment campaigns, joint conferences, courses, lectures, digital marketing efforts, IT workshops, and Japanese language courses. The MOU aims to foster cooperation, build trust, and create opportunities for future collaborations between ITU and Fauji Foundation.

D) MOU with Pink Ribbon:

The Information Technology University of the Punjab and Pink Ribbon Pakistan have formalized a Memorandum of Understanding (MOU) to collaborate in promoting breast cancer awareness, education, and improving access to health-care services. The agreement, signed by ITU Vice Chancellor Prof. Dr. Adnan Noor Mian and Pink Ribbon Pakistan's CEO and Founder, Mr. Omer Aftab, outlines joint initiatives such as seminars, workshops, and information booths to raise awareness about breast cancer and its risk factors among ITU students and the wider community.

E) MOU with DS Group of Industries:

The Information Technology University has signed a Memorandum of Understanding (MOU) with DS Group of Industries to strengthen the Industry-Academia Linkage. Ms. Nazifa Fatima (Chief Marketing Officer - DS Group) and Prof. Dr. Adnan Noor Mian (Vice Chancellor - ITU) formalized the agreement, emphasizing the goal to bridge the gap between industry opportunities and academia's potential. The collaboration aims to create a mutually beneficial experience for both parties.

F) MOU with Creative Group of Industries:

ITU and Creative Group of Industries have signed a Memorandum of Understanding (MOU) to encourage the knowledge-economy concept. Prof. Dr. Adnan Noor Mian, Vice Chancellor of ITU, and Mr. Mian Sultan Mahmood, Chairman & CEO of Creative Group of Industries, signed the MOU, paving the path for a stronger bond and mutual collaboration. The agreement focuses on the exchange of scientific, academic, and technical solutions for the enhancement of industry-academia collaboration.

G) MOU with Lahore College for Women University:

ITU has signed a Memorandum of Understanding (MOU) with Lahore College for Women University to promote joint academic and R&D activities. The agreement, signed by ITU Vice Chancellor Prof. Dr. Adnan Noor Mian and LCWU Vice Chancellor Prof. Dr. Shugufta Naz, enables the exchange of scientific, academic, and technical information, facilitating visits, faculty and student exchanges, joint conferences, and collaborative research and development.

H) MOU with Lahore Garrison University:

ITU and Lahore Garrison University have signed a Memorandum of Understanding (MOU) to establish a framework for collaboration in Computer Science, Software Engineering, Artificial Intelligence, Data Science, Cyber Security, and Information Technology. The agreement, signed by ITU Vice Chancellor Prof. Dr. Adnan Noor Mian and LGU Vice Chancellor Maj. Gen. Muhammad Khalil Dar HI(M) (Retd), covers curriculum development, specialized course design, student skills development, faculty training, research and development, and collaborative events.

I) MOU with Pakistan Tanners Association:

Information Technology University and Pakistan Tanners Association (Northern Zone) have signed a Memorandum of Understanding (MOU) to encourage the knowledge-economy concept. Prof. Dr. Adnan Noor Mian, Vice Chancellor of ITU, and Mr. Fazalur Rehman Shaikh, Chairman Pakistan Tanners Association (N.Z), formally signed the MOU, fostering collaboration and identifying opportunities for joint research and development in disciplines of mutual interest.

CONCLUSION

The MOUs with the industry underscore the UNESCO Chair on ICTD's dedication to creating meaningful connections between academia and industry. These collaborations are instrumental in promoting knowledge exchange, fostering innovation, and driving joint initiatives in research and development, ultimately contributing to the advancement of ICT and the development of a digitally literate community.

PUBLICATIONS

A) Lightweight real-time WiFi-based intrusion detection system using LightGBM

Abstract:

Attacks on WiFi networks can cause network failures and denial of service for authentic users. To identify such attacks, the deployment of a WiFi Intrusion Detection System (IDS) is crucial. The key objective of WiFi IDS is to protect the network by examining WiFi traffic and classifying it as an attack or normal. The state-of-the-art anomaly-based WiFi IDSs use machine learning (ML) to learn the characteristics of past attacks from WiFi traffic datasets. A lot of research is done on advanced ML-based IDSs but work on WiFi-based IDSs is very limited and is based on old ML models. Most of our communications and devices are dependent on WiFi, therefore there is a dire need to update WiFi IDSs with the latest lightweight ML models. Even though old ML models are effective, they have to suffer from large training and testing times along with high computational costs due to large traffic features and outdated algorithms. Moreover, with emerging technologies like the Internet of Things and big data, WiFi traffic is increasing rapidly. Therefore, the issue of computational cost needs to be addressed properly. Thus, in this research, we propose an efficient ML-based WiFi IDS that utilizes a lightweight state-of-the-art ML model and optimum feature selection to reduce computational cost and provide high performance. With the help of MAC layer information and radiotap headers, our WiFi IDS can detect WiFi attacks that go undetected through normal network-based IDS. The proposed WiFi IDS uses a Light Gradient Boosting Machine (LightGBM) that combines several weak learners into a single, better generalizable, strong learner and uses Gradient-based One Side Sampling to downsample data instances with small gradients during training. The experimental results prove that the proposed solution outperforms other classifiers in accuracy, precision, recall, F1 score, training time, and testing time. The proposed solution provides better accuracy with 26 times less training time and 20% less test time compared to XGBoost. The proposed solution can classify real-time WiFi traffic in the order of microseconds and can be trained efficiently with new data.

Reference:

Areeb Ahmed Bhutta, Mehr un Nisa and Adnan Noor Mian, "Light-weight realtime WiFi-based Intrusion Detection System using LightGBM", Springer Wireless Networks Journal, [JCR IF=2.71, h5 index 56] (accepted for publication, Sept. 2023)

B) Life-long phishing attack detection using continual learning

Abstract:

Phishing is an identity theft that employs social engineering methods to get confidential data from unwary users. A phisher frequently attempts to trick the victim into clicking a URL that leads to a malicious website. Many phishing attack victims lose their credentials and digital assets daily. This study demonstrates how the performance of traditional machine learning (ML)-based phishing detection models deteriorates over time. This failure is due to drastic changes in feature distributions caused by new phishing techniques and technological evolution over time. This paper explores continual learning (CL) techniques for sustained phishing detection performance over time. To demonstrate this behavior, we collect phishing and benign samples for three consecutive years from 2018 to 2020 and divide them into six datasets to evaluate traditional ML and proposed CL algorithms. We train a vanilla neural network (VNN) model in the CL fashion using deep feature embedding of HTML contents. We compare the proposed CL algorithms with the VNN model trained from scratch and with transfer learning (TL). We show that CL algorithms maintain accuracy over time with a tolerable deterioration of 2.45%. In contrast, VNN and TL-based models' performance deteriorates by over 20.65% and 8%, respectively.

Reference:

Asif Ejaz, Adnan Noor Mian & Sanaullah Manzoor, "Life-long phishing attack detection using continual learning", Nature Scientific Reports 13 (1), 11488 (July 2023), (https://www.nature.com/srep), https://doi.org/10.1038/s41598-023-37552-9 [JCR IF 4.996, h5 index 206, Q1 ranked]

C)DHCP DoS and starvation attacks on SDN controllers and their mitigation

Abstract:

Software Defined Networking (SDN) technology offers possibilities to improve network administration through a separate central controller for network switching devices. However, security in SDN is a critical issue and SDN faces new challenges due to shared protocols, inherits flaws from traditional networks and control flexibility. Dynamic Host Configuration Protocol (DHCP) is a crucial protocol for SDN, but DHCP itself poses a security risk to SDN. In our study we performed security analysis for DHCP attacks on RYU, OpenDaylight and Floodlight, three popular SDN controllers. Our research demonstrates that they are vulnerable to starvation attacks and denial of service attacks by flooding DHCP discovery messages, slowing down networks and overloading controllers. In order to address these problems, we looked at state-of-the-art DHCP security approaches and evaluated their performance on these SDN controllers. We proposed and implemented a DHCP security algorithm on the RYU controller based on our analysis.

Our solution utilize flexibility of SDN controller to identify discovery flood packets and verify authentic hosts to mitigate effects of DHCP attacks. Furthermore, the proposed solution transfers the authentic flows to switch for reduction in controller load. We demonstrate that without significant computational load the suggested method successfully rejects malicious DHCP packets, restores the IP address pool, and mitigates the harmful network consequences of DHCP-related attacks. The proposed solution improves the throughput by 3.6 times, transferred data by 66.8%, CPU usage by 93.9% and packet loss by 95% compared to the conventional RYU controller.

Reference:

Hafiz Usama Ishtiaq, Areeb Ahmed Bhutta & Adnan Noor Mian, "DHCP DoS and starvation attacks on SDN controllers and their mitigation", Journal of Computer Virology and Hacking Techniques, 1-11, (May 2023), [JCR IF 1.5, h5 index 22, Q1 ranked]

D) Deep learning based speed bumps detection and characterization using smartphone sensors

Abstract:

In recent years lot of research has been done on road surface anomaly detection due to the widespread availability of smartphones, pre-equipped with diverse sensors. The existing literature is mainly focused on speed bump, pot-hole and man-hole and does not provide any information about the type of bumps. Speed bumps have four major types i.e. sinusoidal-profile, flat-top, thermoplastic and round-top. The decision of deploying a particular type is made based upon the location and the speed limit in that area. In this paper we not only detect speed bumps but also identify the bump types. We first collected the speed bump dataset from smartphone sensors and performed series of dataset transformations. Using this dataset we proposed and experimented with deep learning-based speed bump detection and characterization system which is able to achieve the test accuracy of 98.92% and 95% respectively. This work can, not only help the government and policymakers to identify illegal speed bumps but also help decrease the number of road accidents, avoid damage to the vehicles, and reduce the environmental, health as well as financial losses due to non-standard or sub-standard bump types. Moreover, this work can be integrated into road navigation apps like Google Maps, Waze, etc. which can help determine the optimal routes for the drivers.

Reference:

Amir Salman, Adnan Noor Mian, "Deep learning based speed bumps detection and characterization using smartphone sensors", Elsevier, Pervasive and Mobile Computing, Vol. 92, Issue C, (May 2023), https://doi.org/10.1016/j.pmcj.2023.101805, [JCR IF 4.3, h5 index 41, Q1 ranked]

E) On Layout Optimization of Wireless Sensor Network Using Meta-Heuristic Approach

Abstract:

One of the important research issues in wireless sensor networks (WSNs) is the optimal layout designing for the deployment of sensor nodes. It directly affects the quality of monitoring, cost, and detection capability of WSNs. Layout optimization is an NP-hard combinatorial problem, which requires optimization of multiple competing objectives like cost, coverage, connectivity, lifetime, load balancing, and energy consumption of sensor nodes. In the last decade, several meta-heuristic optimization techniques have been proposed to solve this problem, such as genetic algorithms (GA) and particle swarm optimization (PSO). However, these approaches either provided computationally expensive solutions or covered a limited number of objectives, which are combinations of area coverage, the number of sensor nodes, energy consumption, and lifetime. In this study, a meta-heuristic multi-objective firefly algorithm (MOFA) is presented to solve the layout optimization problem. Here, the main goal is to cover a number of objectives related to optimal layouts of homogeneous WSNs, which includes coverage, connectivity, lifetime, energy consumption and the number of sensor nodes. Simulation results showed that MOFA created optimal Pareto front of non-dominated solutions with better hyper-volumes and spread of solutions, in comparison to multi-objective genetic algorithms (IBEA, NSGA-II) and particle swarm optimizers (OMOPSO, SMOPSO). Therefore, MOFA can be used in real-time deployment applications of large-scale WSNs to enhance their detection capability and quality of monitoring.

Reference:

Abeeda Akram, Kashif Zafar, Adnan Noor Mian, Abdul Rauf Baig, Riyad Almakki, Lulwah AlSuwaidan, Shakir Khan, "On Layout Optimization of Wireless Sensor Network Using Meta-Heuristic Approach", Computer Systems Science and Engineering, Vol. 46, No.3, pp. 3685–3701, April 2023, Publisher Tech Science Press, https://doi.org/10.32604/csse.2023.032024

F) Blockchain-based privacy-preserving authentication protocol for UAV networks

Abstract:

Unmanned aerial vehicles (UAVs) are getting common in the market nowadays and being used in numerous real-time applications because they are lightweight, cost-effective, easy to control. With the growth of emerging UAV technology, it also needs to improve the security in many applications that are using this technology for solving multipurpose use cases. However, the malicious use of UAVs threatens privacy and security, so there is an immense need to secure critical information by preventing the UAVs from being tampered with denial of service (DoS) attacks, impersonation attacks, and man-in-the-middle attacks. To fulfill such a goal, in this paper, we design a new blockchain-envisioned authenticated key agreement mechanism in a UAV network. We prove the security of our proposed protocol using the random oracle model and also with the AVISPA tool under the given adversarial model. We also provide the informal security analysis that shows the protocol is secure against various attacks such as man-in-the-middle attack, denial of service attack and impersonation attack. Furthermore, to realize the performance of our proposed protocol, we perform comparative analysis in terms of security features, communication, and computation costs. We show that the proposed protocol performs better than Kaur et al. by 10.45%. Finally, the comparative analysis shows that the proposed protocol offers better communication and computation performance and added security features as compared to the state-of-the-art authentication protocols.

Reference:

Muhammad Arslan Akram, Hira Ahmad, Adnan Noor Mian, Anca Delia Jurcut, Saru Kumari, Blockchain-based privacy-preserving authentication protocol for UAV networks, Computer Networks, Elsevier, Vol. 224, 109638, April 2023. [JCR IF 5.493, h5 index 77, Q1 ranked]

Sustainable Development Goals (SDGs) by TRENDS / IoT and Security lab Information Technology University, Lahore

Information Technology University (ITU), Lahore TRENDS (Technology and Research in Emerging Networks and Distributed Systems) / IoT and Security lab directed by Dr. Adnan Noor Mian is working on the following sustainable development goals (SDGs).

Sustainable Development Goal 3 (SDG 3) - Good Health and Well-being

SDG 3 aims to ensure healthy lives and well-being for all, addressing maternal and child mortality, communicable diseases, universal health coverage, mental health, and equitable healthcare access. It strives to enhance healthcare quality and education globally.

In this SDG we are working on the following areas.

1. Privacy-Preserving E-Health Security:

This project advances SDG 3 by securing healthcare data using a privacy-preserving and anonymous authenticated key-agreement scheme. The scheme ensures sensitive medical information remains confidential, fostering trust in remote health monitoring. By providing a secure platform, the project contributes to better health outcomes and well-being.

2. IoT-Based Remote Health Monitoring:

Aligned with SDG 3, this project creates an IoTbased health monitoring system. It facilitates remote health tracking, enabling swift interventions and improved health outcomes. Particularly impactful in underserved areas, the project contributes to universal well-being by addressing health challenges and enhancing healthcare quality.

Sustainable Development Goal 4 (SDG 4) - Quality Education:

SDG 4 aims to provide inclusive and equitable quality education for all, emphasizing innovations in technology and teaching methodologies. It strives to enhance learning outcomes, promote lifelong learning, and ensure equal access to education.

In this SDG we are working on the following areas

1. Urdu Caption Generation:

Aligned with SDG 4, this project directly contributes to quality education by developing technology for generating captions in Urdu. This advancement has the potential to enrich educational experiences by facilitating language learning, increasing content accessibility, and promoting linguistic diversity. By leveraging technology, the project empowers learners with more inclusive and engaging educational materials.

2. Forensic Analysis of Video Conferencing App:

Indirectly linked to SDG 4, this project supports quality education by ensuring the security and reliability of digital communication platforms. As educational institutions embrace online learning and virtual communication, the integrity of video conferencing apps becomes paramount. By subjecting these apps to forensic analysis, vulnerabilities can be identified and security can be enhanced, creating a safer digital environment for delivering quality education.

Sustainable Development Goal 5 (SDG 5) - Gender Equality:

SDG 5 aims to achieve gender equality and empower all women and girls. It focuses on eliminating discrimination, violence, and harmful practices, ensuring equal participation in decision-making, and providing access to quality education and economic opportunities.

In this SDG we are working on the following areas.

Blockchain-based Women Harassment Complaint System:

Aligned with SDG 5, this project directly contributes to gender equality by addressing issues related to women's empowerment and safety. Implementing a blockchain-based complaint system aligned with the Pakistan Act (PAHWAWA 2010) provides a secure and transparent platform for women to report harassment incidents. This initiative advances gender equality by promoting a safe and accountable environment, fostering diverse leadership, and contributing to women's empowerment through technology.

Sustainable Development Goal 7 (SDG 7) - Affordable and Clean Energy:

SDG 7 focuses on ensuring access to affordable, reliable, sustainable, and modern energy for all. It aims to increase the share of renewable energy, improve energy efficiency, and enhance global energy sustainability.

In this SDG we are working on the following areas.

1. Privacy-Preserving Residential Load Forecasting

Directly aligned with SDG 7, this project contributes to affordable and clean energy by focusing on load forecasting for residential energy consumption. Utilizing privacy-preserving techniques and advanced models like transformers, the research optimizes energy usage. This approach promotes clean energy practices, enhances energy efficiency, and facilitates access to affordable and sustainable energy sources.

2. Post-Quantum Secure Authentication for Low-Powered Devices

Also directly aligned with SDG 7, this project advances affordable and clean energy by enhancing the energy efficiency of low-powered devices. The implementation of secure authentication and keyexchange schemes optimizes energy consumption, leading to extended battery life and reduced reliance on energy sources. By promoting energy conservation in technology, the project supports the goal of clean and sustainable energy solutions that are affordable and accessible.

Sustainable Development Goal 8 (SDG 8) - Decent Work and Economic Growth:

SDG 8 aims to promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all. It focuses on job creation, labor rights, fair wages, and fostering an environment that supports entrepreneurship and innovation.

In this SDG we are working on the following areas.

1. Deep Learning-Based Vulnerable Smart Contract Detection

Indirectly linked to SDG 8, this project contributes to decent work and economic growth by enhancing the security of digital systems. By preventing potential vulnerabilities and security breaches in smart contracts, the project maintains trust in digital transactions and the overall digital ecosystem. This indirectly supports economic growth by fostering an environment conducive to secure and reliable digital interactions.

2. Blockchain-based Women Harassment Complaint System

Aligned with SDG 8, this project directly contributes to decent work and economic growth by addressing harassment issues in workplaces and public spaces. By establishing a blockchain-based complaint system according to the Pakistan Act (PAHWAWA 2010), the project creates mechanisms to address harassment, fostering inclusive and safe work environments. This initiative supports SDG 8's goal of promoting decent work practices and contributing to a conducive environment for economic growth.

Sustainable Development Goal 9 (SDG 9) - Industry, Innovation, and Infrastructure:

SDG 9 aims to build resilient infrastructure, promote sustainable industrialization, and foster innovation. It emphasizes technological advancements, research, and sustainable development of infrastructure.

In this SDG we are working on the following areas.

1. An Enhanced and Efficient Privacy-Preserving Authentication Protocol for V2G Network

Directly aligned with SDG 9, this project contributes to industry and innovation by developing advanced authentication protocols for vehicle-to-grid (V2G) networks. This innovation enhances digital infrastructure, fostering sustainable energy practices and promoting secure technology adoption.

2. Performance evaluation of critical data storage application for E-stamp:

This project contributes to SDG 9 by focusing on the evaluation of critical data storage technology. Robust and efficient data storage solutions are essential for building resilient digital infrastructure and fostering innovation in administrative processes. The evaluation of such technology ensures the development of reliable systems that support government services, contributing to improved efficiency and effectiveness in delivering services to citizens.

3. Post-Quantum Secure Authentication and Key-Exchange Schemes for Low-Powered Devices

Aligned with SDG 9, this project directly involves innovative cybersecurity solutions. By developing secure authentication and key-exchange methods, the project enhances digital infrastructure, promotes innovation in cybersecurity, and ensures the resilience of information systems.

4. Deep Learning-Based Vulnerable Smart Contract Detection

Aligned with SDG 9, this project utilizes deep learning to enhance cybersecurity infrastructure. By identifying vulnerabilities in smart contracts, the research contributes to digital resilience, fostering innovation in secure software development.

5. Privacy-Preserving Residential Load Forecasting using Modified Federated Learning and Transformers:

This topic aligns with SDG 9 by applying innovative techniques for load forecasting. The project's modified federated learning and transformer models contribute to building resilient infrastructure, fostering innovation, and enhancing energy efficiency.

6. Life-Long Phishing Attack Detection using Continual Learning:

Aligned with SDG 9, this project fosters innovation in cybersecurity through the development of advanced methods for continuous phishing attack detection. By improving threat detection capabilities, the project enhances digital infrastructure resilience.

7. Security Analysis and Mitigation of DHCP Server Attacks through SDN Controllers:

Aligned with SDG 9, this research addresses cybersecurity threats to networking infrastructure. By utilizing software-defined networking (SDN) controllers, the project promotes the development of secure and resilient digital systems.

8. Privacy-Preserving and Anonymous Authenticated Key-Agreement Scheme for EHealth System using Wireless Medical Sensor Network

This project aligns with SDG 9 by innovatively ensuring secure communication in e-health systems. The application of wireless medical sensor networks contributes to robust digital infrastructure development.

9. Safety-Oriented Fuzz Testing for Automotive Grade Software:

Directly aligned with SDG 9, this project focuses on safety testing for automotive software. By enhancing software reliability, the research contributes to building resilient digital infrastructure and promoting safe transportation.

10. Multi Image Steganography using Deep Encoder-Decoder Network:

This topic directly aligns with SDG 9 by employing innovative deep encoder-decoder networks for steganography. The research promotes advancements in digital communication techniques.

11. DAGShare: A Distributed Personal File Sharing System:

Aligned with SDG 9, this project develops an innovative distributed file-sharing system. The creation of advanced sharing systems contributes to technological innovation and digital infrastructure enhancement.

12. Continual Learning for Intelligent Phishing Attacks Detection

This topic aligns with SDG 9 by fostering cybersecurity innovation through advanced phishing attack detection methods. By continuously improving threat detection, the research contributes to digital infrastructure resilience.

13. Estimating Packet Reception Rate (PRR) in LoRaWAN: A Comprehensive Analysis using N Packets with Machine Learning:

Aligned with SDG 9, this project utilizes machine learning to predict LoRa link packet reception ratios. This innovative application in wireless communication systems advances technology and digital infrastructure.

14. Forensic Analysis of Video Conferencing App:

Aligned with SDG 9, this research addresses the security aspects of digital communication. The forensic analysis enhances the reliability and security of video conferencing platforms.

15. Vulnerabilities of Mobile Devices:

Directly aligned with SDG 9, this research examines vulnerabilities in mobile devices. The enhancement of mobile device security contributes to building resilient digital infrastructure and fostering innovation in mobile technology.

16. Intrusion Detection in IoT Device using Learning Algorithms:

Aligned with SDG 9, this project applies learning algorithms to enhance IoT device security. By utilizing innovative techniques for intrusion detection, the research contributes to resilient digital infrastructure and fosters innovation in the IoT domain.

17. Bibliometric Analysis of Cybersecurity:

Directly aligned with SDG 9, this project analyzes cybersecurity research trends and advancements. Conducting bibliometric analysis identifies innovative approaches, contributing to digital infrastructure advancement and fostering innovation in cybersecurity.

18. Malware Detection using Deep Learning:

Aligned with SDG 9, this project utilizes deep learning to enhance digital infrastructure security.

Sustainable Development Goal 10 (SDG 10) - Reduced Inequality:

SDG 10 aims to reduce inequalities within and among countries, addressing various dimensions of inequality including income, gender, age, disability, and more. It emphasizes social, economic, and political inclusion for all individuals and groups.

In this SDG we are working on the following areas.

Blockchain-based Women Harassment Complaint System:

Aligned with SDG 10, this project directly contributes to reducing inequality by addressing gender-based harassment. By establishing a blockchain-based complaint system according to the Pakistan Act (PAHWAWA 2010), the project provides a platform for individuals to report incidents of harassment fairly and effectively. This initiative promotes equal access to justice and ensures that marginalized groups, especially women, have a mechanism to seek redress and achieve greater equality within society.

Sustainable Development Goal 11 (SDG 11) - Sustainable Cities and Communities:

SDG 11 aims to make cities and human settlements inclusive, safe, resilient, and sustainable. It focuses on enhancing urban planning, infrastructure, and services to create livable and sustainable urban environments.

In this SDG we are working on the following areas.

1. An Enhanced and Efficient Privacy-Preserving Authentication Protocol for V2G Network

This topic aligns with SDG 11 by promoting smart city solutions through vehicle-to-grid networks. Implementing privacy-preserving authentication protocols in V2G networks contributes to secure and efficient urban energy systems, fostering sustainable urban development.

2. Post-Quantum Secure Authentication for Low-Powered Devices:

Indirectly related to SDG 11, this project enhances the security of low-powered devices, which could be integral to smart city applications. By ensuring the security of devices that may contribute to urban infrastructure, the project indirectly supports sustainable and secure urban development.

3. Safety-Oriented Fuzz Testing for Automotive Grade Software:

Aligned with SDG 11, this project enhances urban transportation safety by focusing on automotive software reliability. By promoting safe mobility within cities, the research contributes to sustainable urban development and the well-being of urban populations.

4. Estimating Packet Reception Rate (PRR) in LoRaWAN: A Comprehensive Analysis using N Packets with Machine Learning:

Directly aligned with SDG 11, this project improves urban infrastructure by enhancing wireless communication systems like LoRa. By predicting and optimizing packet reception ratios, the research supports efficient and reliable urban communication networks.

5. Intrusion Detection in IoT Device using Learning Algorithms:

Aligned with SDG 11, this project ensures the security of IoT devices in urban environments. Enhancing IoT device security contributes to creating safe and sustainable cities, aligning with the goal of resilient urban development.

6. Intrusion Detection System on IoT Device:

Directly aligned with SDG 11, this research enhances the security of IoT devices within urban settings. By contributing to the security of IoT infrastructure, the project supports the development of safe and sustainable smart cities.

Sustainable Development Goal 7 (SDG 7) - Affordable and Clean Energy:

SDG 7 focuses on ensuring access to affordable, reliable, sustainable, and modern energy for all. It aims to promote renewable energy sources, energy efficiency, and clean energy technologies.

In this SDG we are working on the following areas.

1. Privacy-Preserving Residential Load Forecasting using Modified Federated Learning and Transformers:

Directly aligned with SDG 7, this project contributes to responsible consumption and production by optimizing residential energy consumption through load forecasting. By implementing privacy-preserving techniques and advanced models, the research promotes sustainable energy practices and efficient energy consumption.

2. Estimating Packet Reception Rate (PRR) in LoRaWAN: A Comprehensive Analysis using N Packets with Machine Learning:

A Practical Perspective: Aligned with SDG 7, this research enhances wireless communication systems like LoRa, which contribute to establishing smart and sustainable urban environments. By optimizing communication efficiency, the project indirectly supports the goal of affordable and clean energy.

3. Intrusion Detection in IoT Device using Learning Algorithms:

This project aligns with SDG 7 by ensuring the security of IoT devices within urban environments. The enhancement of IoT device security is vital for building safe and sustainable cities, aligning with the goal of providing clean energy solutions for urban populations.

Sustainable Development Goal 13 (SDG 13) - Climate Action

SDG 13 aims to combat climate change and its impacts. It emphasizes climate resilience, adaptation, and the reduction of greenhouse gas emissions.

In this SDG we are working on the following areas.

Post-Quantum Secure Authentication and Key-Exchange Schemes for Low-Powered Devices:

While the primary focus of this project is on authentication and key-exchange schemes, it indirectly aligns with SDG 13 by contributing to the creation of secure and sustainable climate infrastructure. By enhancing the security of low-powered devices, which could be integral to smart city applications, the project indirectly supports the development of resilient and secure technologies that can aid in climate change mitigation strategies.

Sustainable Development Goal 15 (SDG 15) - Life on Land

SDG 15 focuses on protecting, restoring, and promoting sustainable use of terrestrial ecosystems, managing forests sustainably, combating desertification, and halting biodiversity loss.

In this SDG we are working on the following areas.

1. An Enhanced and Efficient Privacy-Preserving Authentication Protocol for V2G Network:

While the primary alignment is with SDG 11, which focuses on sustainable cities and communities, the secure integration of electric vehicles into energy systems indirectly supports SDG 15. By ensuring the privacy and security of vehicle-to-grid networks, the project contributes to sustainable urban development while also playing a part in safeguarding terrestrial life and habitats.

2. Safety Oriented Fuzz Testing for Automotive Grade Software:

While the primary alignment is with SDG 11, which emphasizes sustainable urban transportation systems, this project also contributes to SDG 15. Ensuring the reliability of automotive software through safety-oriented testing contributes to safe transportation systems and indirectly supports the preservation of terrestrial ecosystems and habitats.

Sustainable Development Goal 16 (SDG 16) - Peace, Justice, and Strong Institutions:

SDG 16 focuses on promoting peaceful and inclusive societies, ensuring access to justice, and building effective, accountable, and inclusive institutions at all levels.

In this SDG we are working on the following areas.

1. Deep Learning based Vulnerable Smart Contract Detection:

This project aligns with SDG 16 by contributing to the establishment of strong and secure digital systems. By detecting vulnerable smart contracts through deep learning, the research supports the goal of building inclusive and just digital institutions, enhancing the overall security of digital transactions.

2. Security Analysis and Mitigation of DHCP Server Attacks through SDN Controllers:

Aligned with SDG 16, this research addresses vulnerabilities in digital systems and promotes strong and secure institutions in the cyber domain. By ensuring the integrity of networking systems, the project contributes to peace and security in the digital realm.

3. Privacy-Preserving and Anonymous Authenticated Key-Agreement Scheme for EHealth System using Wireless Medical Sensor Network:

Indirectly related to SDG 16, this project contributes to the establishment of strong and secure digital institutions within the healthcare sector. By safeguarding patient privacy and addressing security concerns, the research supports the goal of building effective and accountable digital healthcare systems.

4. Multi Image Steganography using Deep Encoder Decoder Network:

While not the primary focus, this project indirectly relates to SDG 16 by addressing security concerns. The development of steganography techniques contributes to secure communication and supports the establishment of strong and secure digital systems.

5. Continual Learning for Intelligent Phishing Attacks Detection:

Aligned with SDG 16, this research strengthens the ability to detect phishing attacks, promoting strong institutions through improved cybersecurity measures. Preventing cyber threats contributes to a safer and more secure digital environment.

6. Blockchain-based Women Harassment Complaint System according to Pakistan Act (PAHWAWA 2010):

Directly aligned with SDG 16, this project fosters strong institutions through enhanced transparency, accountability, and justice in addressing harassment cases. The blockchain-based system contributes to promoting peace, justice, and the rule of law.

7. Forensic Analysis of Video Conferencing App:

This topic directly aligns with SDG 16 by involving forensic analysis to ensure the integrity and security of digital communication. Conducting forensic analysis on video conferencing apps contributes to strong institutions by promoting accountability, transparency, and cybersecurity in digital communications.

8. Vulnerabilities of Mobile Devices:

Addressing vulnerabilities in mobile devices supports SDG 16 by promoting strong institutions through improved cybersecurity measures. Preventing cyber threats contributes to a safer digital environment and helps ensure peace and security in the cyber realm.

9. Bibliometric Analysis Cybersecurity:

Analyzing the state of cybersecurity research through bibliometric analysis supports SDG 16 by promoting strong institutions. Understanding research trends and gaps can lead to informed policy decisions and strategies to enhance cybersecurity, contributing to peace and security in the digital realm.

10. Malware Detection using Deep Learning:

Detecting and preventing malware attacks supports SDG 16 by promoting strong institutions through improved cybersecurity measures. Preventing cyber threats contributes to a more secure digital environment and helps ensure peace and security in the digital realm.

11. In-depth Analysis of Wi-Fi Authentication Attacks:

Conducting in-depth analysis of WiFi authentication attacks supports SDG 16 by promoting strong institutions through improved cybersecurity measures. Preventing cyber threats contributes to a more secure digital environment and helps ensure peace and security in the digital realm.

12. Ethereum Malicious Node Classification for Limited Data:

The classification of malicious nodes in Ethereum networks supports SDG 16 by promoting strong institutions through enhanced cybersecurity measures. Preventing cyber threats and malicious activities contributes to a more secure digital environment, promoting peace and security in the digital realm.

Sustainable Development Goal 17 (SDG 17) - Partnerships for the Goals:

SDG 17 focuses on strengthening global partnerships and cooperation to achieve all the other Sustainable Development Goals.

In this SDG we are working on the following areas.

1. Blockchain-based Women Harassment Complaint System according to Pakistan Act (PAHWAWA 2010):

Collaborative efforts between various stakeholders, including governmental bodies, technology developers, and civil society, are crucial for the successful implementation of a blockchain-based complaint system. This aligns with SDG 17 by fostering partnerships to achieve common objectives, such as addressing genderbased harassment issues.

2. DAGShare: A Distributed Personal File Sharing System:

Successful implementation of a distributed file sharing system often requires collaboration among developers, users, and stakeholders. The topic aligns with SDG 17 by fostering partnerships to achieve shared objectives related to information and resource sharing.

3. Security Analysis and Mitigation of DHCP Server Attacks through SDN Controllers:

Collaborative efforts are often required to address cybersecurity challenges. This topic aligns with SDG 17 by fostering partnerships between researchers, industry experts, and policymakers to achieve common goals related to enhancing digital security and building a resilient cyber infrastructure.

4. Estimating Packet Reception Rate (PRR) in LoRaWAN: A Comprehensive Analysis using N Packets with Machine Learning

Research projects like this often require collaboration between researchers, engineers, and stakeholders. By contributing to the advancement of LoRaWAN technology and network analysis, this work aligns with the essence of SDG 17, emphasizing partnerships to achieve common objectives


SUSTAINABLE DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

MAIN ACHIEVEMENTS

A) Promotion of Industry-Academia Collaboration:

One of the notable achievements of the UNESCO Chair on Information and Communication Technologies for Development (ICTD) during the reporting period revolves around the successful promotion of Industry-Academia Collaboration. The establishment of Memoranda of Understanding (MOUs) with industry leaders, has been instrumental in creating an environment conducive to meaningful collaborations. This achievement is pivotal in bridging the traditional gap between academia and industry, thereby fostering innovation within the ICTD landscape.

B) Capacity Building through Short Courses:

The initiative to promote Capacity Building through Short Courses represents a key achievement for the UNESCO Chair on Information and Communication Technologies for Development (ICTD). The launch of these short courses in Information Technology (IT) signifies a proactive effort to address the evolving demands of the digital landscape and contribute to the development of individuals, both students and professionals alike. The impact of these short courses, as they impart valuable skills and knowledge, enhance employability, and foster growth within the IT sector.

C) Engagement with Experts and Industry Leaders:

The UNESCO Chair on Information and Communication Technologies for Development (ICTD) has made significant steps in fostering Engagement with Experts and Industry Leaders through impactful events such as the Table Talk on Cyber Security and the Ebryx Session. These events have played a pivotal role in creating a platform for meaningful dialogue and collaboration between academia and professionals from the industry.

CHALLENGES FACED

A) Navigating the IT Landscape:

The statement "Navigating the IT Landscape" encapsulates the dynamic and ever-evolving nature of the Information Technology (IT) field, acknowledging the challenges posed by rapid advancements in technology and cybersecurity. The phrase underscores the necessity for individuals and professionals within the IT domain to engage in continuous learning and adaptation to stay current with the latest trends and developments.

B) Ensuring Sustainable Collaboration:

The statement "Ensuring Sustainable Collaboration" underscores the recognition that establishing Memoranda of Understanding (MOUs) with industry partners is a noteworthy accomplishment, but the journey toward building and maintaining long-term, mutually beneficial collaborations demands continuous commitment, effort, and engagement.

FUTURE PLANS

Our "Future Plans" outlines the vision of the UNESCO Chair on Information and Communication Technologies for Development (ICTD) to advance the field of ICTD through the implementation of a new Master of Science (MS) degree program in Cyber Security & Diploma of Advance Studies in Artificial Intelligence (DAS AI). This initiative reflects a commitment to staying at the forefront of technological advancements and addressing the evolving challenges within the field. The expansion of offerings to include a specialized program in Cyber Security & Diploma of Advance Studies in Artificial Intelligence (DAS AI) aligns with the UNESCO Chair's mission to provide comprehensive education and prepare students for the complexities of the digital landscape.

CONCLUSION

The timeframe covering March 2023 to March 2024 has been characterized by the accomplishments and productive collaborations within the UNESCO Chair of ICTD. Our commitment persists in boosting the ICTD field forward, promoting innovation, and cultivating the growth of the upcoming generation of IT professionals and researchers. We express sincere appreciation to UNESCO for their invaluable support, and we eagerly anticipate the ongoing collaboration to further elevate excellence in the field of ICTD.

Sincerely,
Prof. Dr. Adnan Noor Mian
Vice Chancellor
Information Technology University of the Punjab

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