



AI and Digital Science

Research Center

**Pioneering next-gen AI,
telecommunications,
and secure systems
to future-proof our world**

tii.ae

Digital first solutions in the AI, telecommunications, and cyber-security space

The Artificial Intelligence and Digital Science Research Center (AIDRC) at TII is pioneering and enabling digital transformation in the UAE and beyond, through fostering the adoption of safe, sustainable, and reliable intelligent autonomous and connected systems, applications, and services.

We are a unique multi-disciplinary and industry-focused applied research and development (R&D) center, and work with a range of disruptive technologies from AI, Security and Wireless Communications (B5G, 6G) to bring to life operational and practical solutions to key challenges faced across vertical markets during their digital transformation journey. In line with the commitment of our leadership to this thriving sector, we work in synergy with key international organizations, such as ITU, and 3GPP in our efforts to make a difference and inspire far-reaching benefits to society in the UAE and the wider region. In doing so, we are well aligned with the UN's Sustainable Development Goals and its commitment to harnessing AI for good.

Spurring innovation

We conduct breakthrough scientific research, develop innovative technologies and solutions, and validate the viability of individual concepts through experiments and field trials to create novel approaches and effective methods to facilitate their industrialization and deployment at scale.

At AIDRC, our international team convenes eminent experts in the field of AI, cyber-security, and wireless telecommunication from top-tier academic and research institutes, as well as from across the industry spectrum - Mobile, IoT, Automotive, Broadband, and Energy- under one roof, to solve the most sophisticated societal and business challenges.

Thanks to our in-house High-Performance Computing (HPC) capabilities, we can ensure large-scale adoption of AI across multiple vertical markets, applications, and services, and live up to the promise of responsible and trustworthy AI. Our in-depth exploration of Next Generation Wireless telecommunications technologies (B5G/6G), and Cyber-reasoning Security solutions for infrastructure (IoT), SW and systems, bring to market a unique intelligent, connected, autonomous and self-healing capability. Our breakthrough solutions find seamless application in many fields such as Transport, Security and Defense, Manufacturing 4.0, Sustainability, Environment and Energy, Food and Agriculture, Healthcare, and Aerospace.

As part of our organizational DNA, we contribute to reducing our carbon footprint through enabling the deployment of green digital transformative solutions.

Collaborating globally

AIDRC brings together key AI, telecoms and computer security experts from academia, industry and the broader scientific community too.

To accelerate progress, we collaborate with the world's most talented scientists, best-in-class international universities, industry leaders, SMEs, and startups with expertise in several core disciplines. These areas include Deep/Federated/Distributed learning theory and algorithms, Large Language Models (LLM), Edge AI, perception, detection, and recognition sensors and algorithms, MOps, Next Generation Mobility Systems (Internet of Vehicles), Intelligent Wireless Environment (RIS, Reconfigurable Intelligent Surfaces), Internet of Senses (XR, haptics, uRLLC), Digital Twin, Native AI, and Cyber-Reasoning Security systems.

Our partnerships extend to local and international universities and institutions to cross-pollinate ideas and enable the rapid execution of prototype projects.

Innovation for a better world

TII helps build a better world by shaping the most advanced, transformative technological innovations designed to benefit society. As a key component of the Abu Dhabi Government's Advanced Technology Research Council (ATRC), it promotes a culture of exploration with the aim of establishing Abu Dhabi and the UAE as an R&D hub and among the next global leaders in breakthrough technology solutions.

A unique Multi-disciplinary Research Center

In the face of evolving technologies, we are mastering autonomous security reasoning systems, enhancing telecom solutions, and building on our core expertise of AI.

Artificial Intelligence Cross-Center Unit Programs



Data-Driven Technologies and Intelligent Systems

To yield new approaches for complex and real systems and provide novel systems and technologies for challenging ML problems.



AI Theory and Algorithms

To the world with the best AI algorithms through novel learning approaches, statistical models, computational methods, and study the fundamental limitations and strengths of AI-based algorithms.



Computational Systems and Platforms

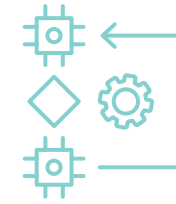
To build scalable AI-based software stack and hardware systems that power the accelerated growth and demand of computers, mobiles, data centers, and networks including wireless networks, databases, industrial infrastructure, and software infrastructure.



Perception, Sensing, and Planning

To understand both the nature of human intelligence and the physical world through designing, implementing multi-disciplinary best practices (perception, sensing, cognitive, planning, language), and integrating these to replicate human-like intelligence.

Digital Telecom Unit Programs



Advanced Telecom Platforms

Develop a virtual representation (Digital Twin) of the real world, for 6G "NextGen Sustainable Smart Mobility". Develop accurate modeling to secure high precision 6G network simulation performance assessment/optimization. Develop in-house a reconfigurable and flexible Open Air interface testing platform (RF/HW/SW) to deploy and validate advanced concepts.



Next Generation Mobility Systems

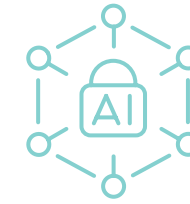
To solve key challenges from Internet of Senses, and Internet of Vehicles to enable NextGen Sustainable Transportation & Freight/Delivery Systems (UAV), via immersive experience (XR, haptics), C-V2X and AI.

Digital Security Unit Programs



Cyber Reasoning for software & System Security

AI-based autonomous security system that takes complete responsibility for defending a set of software services. AI will automatically develop firewall rules to stop attack traffic, analyzing programs to find bugs before an attacker, and patching vulnerabilities in compiled programs without any access to source code. Software defenses that might take human analysts' hours, days, or weeks to develop and test will be all deployed at machine speeds, on the order of tens of seconds, with no humans in the loop.



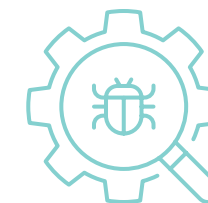
Native AI

Develop avant-garde communication system that understands the meaning of information and the effectiveness of transferring them, 2) Set the basis of multimodal learning for B5G radio networks, 3) Push beyond the wireless edge machine learning for dynamic split and scaling AI models on wireless telecom devices with optimization of the computation resources.



Intelligent Environments

To actively control mmWave and THz Wireless propagation Environment for B5G/6G Mobile Networks, via Holographic MIMO (HMIMO), programmable meta surfaces a.k.a Reconfigurable Intelligent Surfaces (RIS). Special focus onto 3D positioning & Resource allocation to achieve trade-off QoS/QoE.



Cyber Reasoning for Infrastructure Security

AI-based Intrusion detection and protection system (IDS/IPS) for massive IoT Networks, covering all system layers: from the perception, network protocols and application layers. The solution will run at the edge network and application levels (Hybrid mode). Once AI autonomously detects suspicious packets and behaviors, an IoT specific intrusion protection system (IPS) will trigger automatically several actions to make systems bullet-proof against the malicious actions that compromise the availability, integrity, or confidentiality of IoTs.

Developing future talent

Our Visiting Scholars Program provides distinguished researchers at master's and doctorate levels valuable opportunities for professional development, networking and acquiring industry experience. All of our fellows conduct research on specialized topics, with options for both short-term and long-term stays. They collaborate with our experts, present talks at national and international conferences, and host public workshops in their areas of expertise and research.

We also provide exceptional opportunities for post-graduate students to spend two to three years working with our leading principal investigators. During this time, they can also collaborate with local and international academic institutions. In addition, we offer several year-long internship opportunities for both graduate and undergraduate students.



Working with the different priority sectors of the UAE, we are pursuing scientific discovery and groundbreaking innovations in wireless telecommunications and computer security, delivering AI breakthrough technology and solutions for the good of our society.

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