KFUPM

RESEARCH STRATEGY 2024-2030

May 2026

Dr. Muhammad Al-Saggaf
President
King Fahd University
of Petroleum & Minerals

KFUPM's Research Strategy 2024–2030 represents an important step in the University's continued evolution as a globally competitive institution shaping the future of science, technology, and innovation. Guided by the Kingdom's Vision 2030, the strategy reflects our ambition to strengthen KFUPM's contribution to economic diversification, sustainability, and knowledge-based development.

By fostering world-class research, strategic partnerships, and interdisciplinary collaboration, we aim to address critical global challenges while creating meaningful societal impact. This strategy reinforces our commitment to advancing scientific discovery, nurturing innovation, and positioning KFUPM as a leading contributor to future-focused solutions that benefit both the Kingdom and the wider world.

Dr. Ali Al-Shaikhi
Vice President of
Research & Innovation
KFUPM

We have taken a significant step forward in refining the University's research and innovation direction to better align with emerging scientific opportunities and evolving national priorities.

The Research Strategy 2024–2030 strengthens our focus on outcome-oriented research, expanded innovation goals, and stronger integration across research centers and disciplines. It also introduces new strategic priorities and research areas that enhance KFUPM's ability to accelerate technology development, commercialization, and real-world impact.

Supported by our established research ecosystem and disciplined execution frameworks, we will continue transforming knowledge into innovation and innovation into lasting global impact.

KFUPM INNOVATION-BASED RESEARCH STRATEGY

National Focus Areas	KSA's national research priorities that were addressed by KFUPM in the Research Strategy 2024-2030
Energy and Industrial Leadership	• Clean, Economic Hydrogen • Renewable Energy • Crude Oil-to-Chemical Conversion • Geoenergy Leadership • Electric Vehicles (EVs) and EV Batteries • Nuclear Energy
Sustainable Environment and Essential Needs	• Innovative Water Research • Net Zero Emissions • Reuse of Materials and Products in Industry • Biodiversity
Economies of the Future	• Cognitive Cities • Automation of Logistics • Industrial Robots • Net Zero Aviation • New Space Leadership • FinTech • Intelligent Manufacturing
Health and Wellness	• Health and Bioengineering Innovation

CLEAN, ECONOMIC HYDROGEN

KFUPM will invent technologies and develop innovations that enable the following by 2030:

1. Produce hydrogen at less than $0.5/kg
2. Store hydrogen at less than $0.2/kg
3. Distribute hydrogen at less than $0.3/kg

Innovation Goals

- Develop the in-well hydrogen production process to TRL 5 by 2026
- Reduce the cost of electrolyzer stacks (membrane, electrode, etc.) by 50% to produce green hydrogen by 2030
- Improve the cost of hydrogen production from hydrocarbons to less than $0.5/kg by 2030
- Survey 50% of the KSA's geological formations for natural hydrogen sources by 2026
- Develop efficient and sustainable hydrogen storage solutions with a cost of less than $0.2/kg of H2 by 2030
- Identify the geological formations suitable for large scale hydrogen storage by 2026
- Optimize the cost of local distribution of hydrogen to less than $0.3/kg by 2030
- Establish a reliable, adaptable, and cost-effective hydrogen production system, fully powered by renewable energy sources, by 2030

RENEWABLE ENERGY

KFUPM will develop methods and applications that enable the following:

1. Achieve levelized cost of electricity (LCOE) 20% reduction for renewable energy systems in KSA climates by 2030
2. Develop a Saudi electric grid with a ≤2.4 hours/year loss of load expectation (LOLE) at 50% renewable energy penetration by 2030

Innovation Goals

- Develop renewable energy devices that extend lifespan by 20% under harsh environment (Ambient Temp 45–55 °C, Relative Humidity up to 90–95% RH, Soiling Loss 0.5–1% per day) by 2030
- Develop AI-driven monitoring, cooling, and cleaning technologies to reduce power degradation of renewable energy devices by 55% by 2030
- Demonstrate operation of 10 kW redox flow batteries with a cost-effective electrolyte, enabling $100/kWh by 2030
- Develop control and adaptive protection technologies that cut fault clearance time to under 100 ms, keep grid frequency stable within ±0.5 Hz with 50% renewable penetration by 2030

Energy and Industrial Leadership

CRUDE OIL - TO - CHEMICAL CONVERSION

KFUPM will develop the following by 2030:

1. Cost-effective and scalable catalysts/processes that convert 85% crude oil to chemicals
2. An integrated process that converts high-sulfur petroleum coke (more than 8% sulfur) to battery-grade carbon materials for energy storage

Innovation Goals

- Develop efficient and multifunctional catalysts and technology capable of removing 90% of impurities produced in cracking crude oil, resulting in a higher yield of light olefins and BTX aromatics at a conversion rate higher than 80% by 2030
- Develop scalable processes that convert at least 50% of heavy oils to carbon fiber at a cost of $10/kg compared to $35/kg for conventional polyacrylonitrile (PAN) based route by 2030
- Utilize quantum simulation to design multifunctional catalysts that simplify and optimize crude oil-to-chemicals processes by at least 10 times by 2030
- Develop new formulations of polyacrylonitrile (PAN) and optimize their production processes aiming at the targeted production cost ($10/kg) by 2030
- Develop integrated processes to convert high sulfur petroleum coke to low sulfur (less than 1% content) battery grade carbon materials (340 mAh/gr as specific capacity for graphite and 230 mAh/gr as specific capacity for graphene) by 2030

GEOENERGY LEADERSHIP

Energy and Industrial Leadership

KFUPM will develop methods and applications that enable KSA to achieve the following by 2030:

1. Increase the recovery factors from subsurface reservoirs (hydrocarbons, geothermal fluids) by 30%
2. Become the leader in achieving the global sustainability targets of hydrocarbon production, H_2 storage, CO_2 sequestration, and wastewater recycling in petroleum reservoirs

Innovation Goals

- Consolidate geophysical methods (oil and gas, geothermal, CO_2/H_2, groundwater, etc.) in the characterization and monitoring phase by 2030
- Develop and produce oilfield chemicals in a sustainable manner locally (field trial-proven) with the goal of increasing the production potential by 20% and lowering the overall carbon footprint by 50% by 2030
- Develop H_2 and CO_2 storage capabilities for safely and economically sequestering the gases underground and handling the indirect global warming potential of gaseous H_2 by 2030

EVs AND EV BATTERIES

KFUPM will develop an EV charging and propulsion ecosystem tailored toward a harsh environment (Ambient Temp 45–55 °C, Relative Humidity up to 90–95% RH)

Innovation Goals

- Develop Level 2 bidirectional EV chargers achieving 97% efficiency by 2030
- Demonstrate ≥95% validated system-level efficiency for a 5–20 kW EV motor drive system by 2030
- Invent durable battery systems for EVs, achieving energy density exceeding 500 Wh/kg and >1,000 cycles by 2030

NUCLEAR ENERGY

KFUPM will demonstrate a thermal (non-nuclear core) prototype of a Small Modular Reactor (SMR) based on Gen-IV technology by 2030

Innovation Goals

- Optimize the licensed nuclear codes to perform design and safety analyses for the envisaged SMR design by 2030
- Develop and test materials that are capable of operating at temperatures >600 °C to support Gen-IV SMR design by 2030
- Develop a sustainable nuclear waste management strategy for the SMR design by 2030

Energy and Industrial Leadership

KFUPM will invent technologies and develop systems to enable the following by 2030:

1. Develop a chemical system that reduces the energy consumption of wastewater treatment by 50%
2. Invent processes and membranes that can reduce desalination operating expenses by 50%
3. Develop AI algorithms that contribute to reducing the energy consumption of water distribution systems by 50%

Innovation Goals

- Develop chemically assisted membrane-based wastewater treatment systems (anaerobic ammonia oxidation and membrane bioreactor) that reduce energy consumption by 50% by 2030
- Develop a high-recovery desalination process using advanced membranes and brine-mining technologies to cut net operating costs by 50% and convert brine into a strategic resource by 2030
- Develop AI-based control systems for enhancing the energy consumption efficiency of KSA's water supply systems and management by 50%

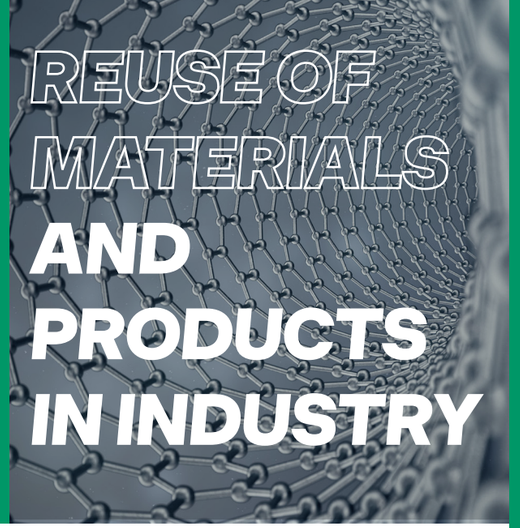
KFUPM will invent technologies and develop systems that will achieve the following by 2030:

1. Contribute to reducing carbon emissions in KSA by 30%
2. Reduce the cost of CO_2 capture to less than $40/C-ton
3. Reduce the cost of carbon storage to less than $10/C-ton
4. Produce applications and materials that utilize 70% of captured carbon
5. Contribute to Net Zero Buildings in Saudi Arabia by 2030

Innovation Goals

- Achieve 60% Reduction in Cooling Loads for residential buildings through Passive Envelope Design by 2030
- Develop advanced combustion technologies to achieve 20% reduction in carbon emissions with respect to 2022 emission levels by 2030
- Reduce Active Energy System Demand by 70% through developing hybrid system technologies by 2030
- Develop software solutions for identifying the factors responsible for emissions and emissions estimation, modeling, and prediction at national and corporate levels by 2028
- Reduce direct air capture (DAC) cost to <$100/C-ton by 2040
- Reduce point-source carbon capture cost to <$80/C-ton by 2030
- Identify geological formations suitable for large-scale CO_2 storage by 2025
- Develop technologies for the conversion of CO_2 to value-added chemicals by 2030
- Develop scalable up to 30% carbon utilization technologies for construction materials (For roads, buildings, and storage infrastructure) by 2030

Sustainable Environment and Essential Needs



REUSE OF MATERIALS AND PRODUCTS IN INDUSTRY

KFUPM will develop innovative methods to achieve the following by 2030:

1. Create technologies and processes for increasing the reuse of waste materials to 30%
2. Enable conversion of polymeric wastes into valuable products
3. Produce graphene from petroleum coke
4. Develop green and scalable technologies to extract, recover, and recycle critical metals in Saudi Arabia by 2030

Innovation Goals

- Recycle/reuse 30% of construction and demolition (C&D) waste in the construction sector by 2030
- Utilize 20% of municipal solid waste (MSW) in the construction sector by 2030
- Utilize 20% of the KSA's industrial waste materials in the construction sector by 2030
- Develop environmentally friendly recycling technologies to achieve >95% recovery of critical minerals from spent batteries by 2030
- Develop cost-effective technology to convert at least 60% of plastic waste into valuable products (aromatics, olefins, paraffins, etc.) by 2030
- Develop a green hydrometallurgical process for extracting gallium from domestic resources that achieves >70% recovery per loading-elution cycle by 2030
- Develop next-generation mechanical metamaterials for additive manufacturing to achieve a stiffness-to-weight ratio of ≥ 75 kPa.m3.g-1 and a specific energy absorption of ≥ 20 J.g-1 by 2030
- Develop cost-efficient technologies to convert at least 60% of biogenic wastes into sustainable aviation fuels (SAF) at a price comparable to that of conventional jet fuels by 2030
- Produce lithium-ion battery-grade graphite that can achieve a delithiation capacity of ≥340 mAh.g-1, from industrial emissions and underutilized materials by 2030
- Develop and scale an electrolytic process for producing highly-ordered graphite at >200 mA.cm-2 current density, ≤2.0 V cell voltage, and >70% Faradaic efficiency by 2030
- Design ionic exchangers for metals hydrometallurgical production that achieve a loading capacity of >500 mg.L-1 with matrix swelling of <35% by 2030
- Demonstrate pilot-scale conversion and/or integration of microalgae biomass and waste-derived feedstocks into self-healing, smart, metamaterial, biomedical, and filtration materials compatible with conventional and additive manufacturing for marine, terrestrial, and airspace applications by 2030

KFUPM will develop the following by 2030:

1. A smart tools-based mapping strategy to enable KSA to conserve 30% of the biodiversity of marine and coastal habitats
2. AI-based algorithms and applications for automated taxonomical identification of KSA's wildlife
3. An environmental surveillance network that enhances the ecosystem status assessment and management response by 50%
4. Development of four or more bio-environmental technologies merging biology, engineering, and AI to predict, prevent, monitor, and mitigate environmental risks (industrial, chemical, and ecological) across marine, terrestrial, and airspace environments to protect planetary health, food security, and human well-being in Saudi Arabia

BIODIVERSITY

Innovation Goals

- Develop a smart tools-based mapping strategy to enable the KSA to conserve 30% of the biodiversity of its marine and coastal habitats by 2030
- Develop AI-based algorithms and applications for automated taxonomical identification of KSA's wildlife by 2030
- Develop an advanced, integrated, and smart environmental surveillance network that will enhance ecosystem status assessment and management response by 50% by 2030
- Apply biomimetics to develop robotic systems or engineered materials capable of operating in at least two extreme environments (aerospace, marine, or terrestrial) to autonomously restore, monitor, and sustain degraded ecosystems, enhance food security, and improve quality of life in Saudi Arabia by 2030
- Deploy an IoLT platform integrating microbial biosensors and AI to detect, monitor, and predict key environmental stressors (air pollution, radiation, chemical contamination, and industrial emissions) across marine, terrestrial, and airspace environments to safeguard planetary and human health by 2030

Sustainable Environment and Essential Needs

COGNITIVE CITIES

KFUPM will develop the following for cognitive cities by 2030:

1. Next-generation, energy-conscious backbone communications and sensing systems
2. Models based on cognitive skills for secure, privacy-preserving, and personalized cyber–physical–social systems
3. Decision-making algorithms based on cognitive skills to create smart mobility services and carbon-free smart transportation modes
4. Automation based on cognitive skills for optimizing services and improving quality of life

Innovation Goals

- Develop next-generation security operations centers (SOCs) with 10× capabilities for cognitive cities by 2030
- Develop a cyber-physical infrastructure that is 5× more trustworthy, resilient, and secure for cognitive cities by 2030
- Develop five secure and privacy-preserving human-centered AI-based systems for cognitive cities by 2030
- Develop five quantum technologies with applications in cognitive cities by 2035
- Create cost-effective frameworks for digital twins of urban cities for use in planning and predicting mobility, urbanization rate, and capacity by 2030
- Work with five cities to develop technologies to map nonstandard features on geographic information systems (GIS) maps by 2030
- Develop sustainable living models and decision-making algorithms for five cities by 2030
- Develop zero-emission intelligent transportation systems and mobility services by 2030
- Develop next-generation high-frequency communication systems that ensure reliable, high-data-rate, and non-line-of-sight connectivity through reconfigurable intelligent surfaces for future cognitive cities by 2030
- Develop next-generation sensing and/or integrated sensing and communication technologies to jointly support reliable detection/localization and communication by 2030
- Develop green ML-based solutions for resource optimization in communications and/or sensing networks by 2030
- Develop an energy-efficient and resilient communication backbone that integrates free-space and underwater optical links, seamlessly connecting terrestrial, airborne, and underwater systems for reliable communication and environmental monitoring by 2030
- Develop Open RAN frameworks and solutions to empower next-generation communication networks with flexibility, scalability, and vendor diversity by 2030
- Develop energy-efficient semiconductor platforms to support advanced sensing, processing, and communication applications by 2030
- Design and implement next-generation electronic circuits and systems that are energy-efficient, reconfigurable, and AI-enabled, addressing the performance and sustainability demands of emerging technologies by 2030
- Develop AI-driven solutions for ultra-reliable and low-latency Non-Terrestrial Networks (NTNs) in mission-critical applications by 2030 by 2030
- Develop Digital Twin frameworks for mobile communication networks under Saudi Arabia’s environmental and operational conditions by 2030
- Develop and experimentally demonstrate reconfigurable antenna/surface technologies with flexible beam control and high efficiency, enabling adaptive next-generation connectivity, energy-efficient IoT, and advanced sensing applications by 2030
- Develop and fabricate transparent and/or flexible microwave devices (including but not limited to absorbers, antennas, and energy-harvesting systems), designed for integration into urban structures and windows by 2030
- Develop secure and resilient wireless communication frameworks to safeguard next-generation networks against unauthorized access by 2030
- Develop hardware-level fault-tolerant quantum units to ensure 5x more trustworthy and resilient cyber-physical city infrastructure by 2030
- Establish a seamless HPC-Quantum integration layer for energy-conscious backbone communication and complex city-wide sensing systems by 2030
- Implement secure, privacy-preserving quantum communication links for personalized cyber-physical-social systems by 2030
- Develop and test Post-Quantum Cryptography (PQC) protocols for the “secure and privacy-preserving” models by 2030

Economies of the Future

AUTOMATION OF LOGISTICS

KFUPM will develop the following:

1. Automation systems that shorten freight forwarding and delivery times and reduce transportation costs of the KSA's shipments by 50% by 2030
2. AI-based routing algorithms for autonomous ground and air vehicles for last-mile delivery of shipments by 2027
3. Develop an AI-Optimized national logistics and mobility system to redefine regional connectivity

Innovation Goals

- Develop digital twins of inter-modal and multi-modal supply chains to increase KSA's logistics performance by more than 25% by 2030
- Design materials handling and shipment intralogistics models based on Internet of Things (IoT)/cloud computing that can be implemented in over 50% of KSA ports by 2030
- Develop smart path planning algorithms for last-mile delivery in order to reduce delivery time by 20% by 2027
- Develop intelligent autonomous systems (drones, automated guided vehicles, and humanoids) for automated last-mile delivery in order to reduce transportation costs by 50% by 2030
- Develop AI models for intermodal and port operations to reduce transportation costs by 50%, improve logistics performance by over 25%, and cut last-mile delivery time by 20% by 2030
- Develop a Value-of-Information-based prioritization framework for logistics digitalization to identify the top five digital investments and achieve 20% reduction in misallocated or low-impact digital spending by 2030
- Develop quantum-inspired algorithms to optimize smart mobility services and carbon-free transportation modes, targeting a 50% reduction in transport costs

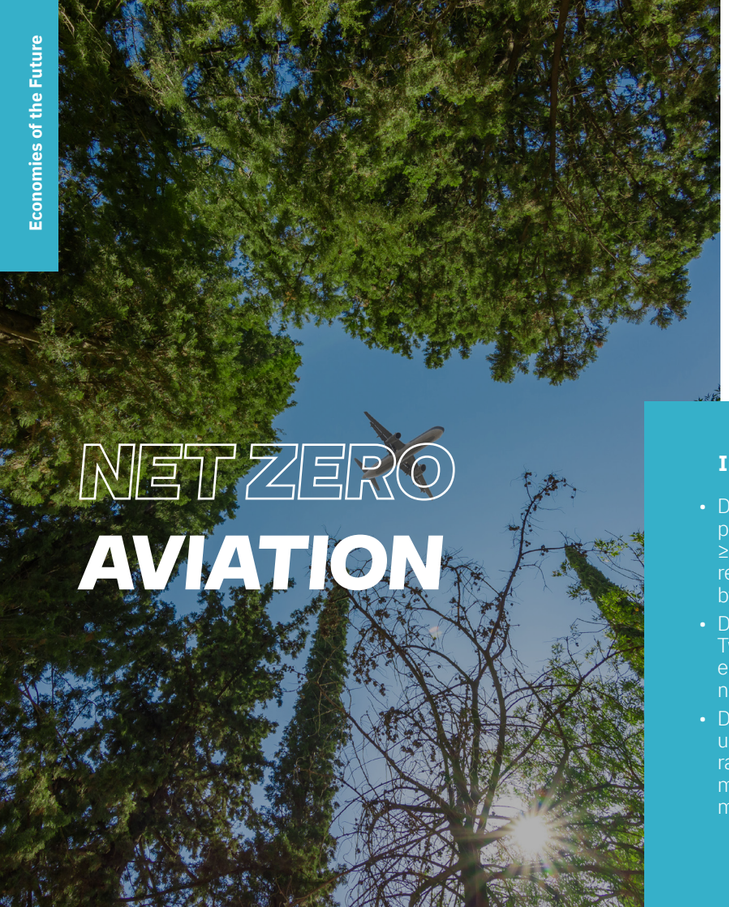
INDUSTRIAL ROBOTS

KFUPM will develop the following by 2030:

1. AI-based self-trainable industrial robots and systems for training industrial robots
2. Industrial robots possessing close-to-human tolerance-for-position capability

Innovation Goals

- Harness learning-based approaches as cognitive engines for advanced robotics enabling systems to reason, learn, and act with a level of adaptability by 2030
- Develop robots with high tolerance to system parameter variations and superior disturbance rejection, leveraging advanced sensing and actuation concepts, including contactless mechanisms, by 2030
- Develop a fully functional six degrees of freedom (6-DoF) proof-of-concept demonstrator autonomous underwater vehicle capable of carrying out routine, dull, dirty, and dangerous tasks intelligently
- Develop a fully functional proof-of-concept demonstrator unmanned surface vehicle capable of carrying out routine, dull, dirty, and dangerous tasks with minimal human intervention
- Develop a fully functional 6-DoF proof-of-concept demonstrator unmanned aerial vehicle capable of carrying out routine, dull, dirty, and dangerous tasks intelligently



NET ZERO AVIATION

KFUPM will enable ≥50% CO_2 equivalent emissions reduction per km in Advanced Air Mobility Technologies by 2030

Innovation Goals

- Demonstrate TRL 3 flight-readiness of hybrid and electric propulsion technologies for regional aviation, targeting ≥50% reduction in mission-level CO_2equivalent emissions relative to representative 2023 regional aviation baselines by 2030
- Develop and validate High-Fidelity Intelligence and Digital Twin frameworks in Design, Materials and Autonomy that enable a ≥10% reduction in CO_2 equivalent per mission for next-gen aircraft by 2030
- Demonstrate operational capability of electric-powered unmanned swarm systems (≥5 agents) for selected short-range missions, achieving up to 100% reduction in per mission carbon emissions relative to conventional manned mission equivalents by 2030

NEW SPACE LEADERSHIP

Economies of the Future

KFUPM will achieve the following by 2030:

1. Develop and Launch Spacecraft Systems for Earth Observation and Laser Communication
2. Develop Lunar Rover and Deep Space Technologies to Support Human Space Missions

Innovation Goals

- Deploy at least 1 Space-qualified CubeSat (6U+) for high-resolution Earth Observation and Novel Technology Validation by 2030
- Deploy 90% accurate AI-powered Geospatial Platform to Provide Decision-making insights about Urban Planning and Environmental Monitoring using Satellite data with by 2030
- Develop Environment-tested Lunar Rover platform to enable Saudi human-robotic exploration missions by 2030
- Develop Robust Space Situational Awareness framework for mitigating Extreme Space Weather and Debris effect, by providing early warning for Saudi space assets by 2030

FINTECH

KFUPM will achieve the following by 2030:

1. Develop a resilient and Shariah-compliant digital finance ecosystem in the Kingdom through financial innovation, inclusive artificial intelligence (AI)-powered small and medium-sized enterprises (SME) finance, and intelligent automation for risk management and compliance across financial technology (FinTech) sectors
2. Create a national economic-intelligence platform to grow innovation-focused foreign direct investment (FDI) inflows into targeted innovation activities by 2030
3. Assess the impact of Fintech and Industry 4.0 technologies on the national economy and Saudi consumers while contributing to the digital ecosystem by promoting innovation, learning, and entrepreneurship to produce market products and services that create sustainable value for consumers and society at large
4. Develop trusted AI-enabled FinTech and digital responsibility solutions for tourism ecosystems to enhance visitor experiences, enable secure and transparent transactions, support data-driven governance, and strengthen stakeholder trust

Innovation Goals

- Develop an AI system for small and medium-sized enterprises (SME) lending that improves risk prediction and reduces new default inflows by ≥15% by 2030
- Develop an explainable AI model for debt-based crowdfunding to strengthen borrower screening and investor protection, achieving ≥20% reduction in platform default by 2030
- Develop an explainable AI analytics platform to achieve a ≥25% reduction in fraudulent claims and a concurrent ≥10% reduction in anomalous payment leakage by 2030
- Develop a policy diagnostic framework for microfinance and crowdfunding to quantify market barriers and recommend reforms that increase access by 20-30% by 2030
- Design a national digital-economy foreign direct investment (FDI) acceleration policy package to cut approval time by 40 percent and double lead-to-commitment conversion by 2030
- Create FDI analytics framework to quantify the impact of projects and reforms, supporting data-driven progress toward the 5.7% gross domestic product (GDP) FDI target by 2030
- Develop adoption and usage research frameworks of 30 FinTech solutions across digital payment, digital capital raising, and neo-banking by 2028
- Develop 20 emerging technology adoption and usage frameworks to advance digital transformation and assess economic impact across healthcare management, marketing, innovation and entrepreneurship, finance, creative industries, education, government, and real estate by 2030
- Develop two AI-enabled FinTech frameworks that increase the purchase of tourists' gifts by ≥10% across 10 tourism businesses by 2030 through secure and transparent transactions and privacy-aware personalization
- Develop three esports tourism innovation models using insights from major events, esports gamers and audiences, and generate validated evidence of increased event-related tourist arrivals and a 5-10% uplift in average length of stay by 2028

INTELLIGENT MANUFACTURING

KFUPM will develop AI-enabled adaptive manufacturing platforms with digital twins for optimized, predictive, and resource-efficient manufacturing by 2030

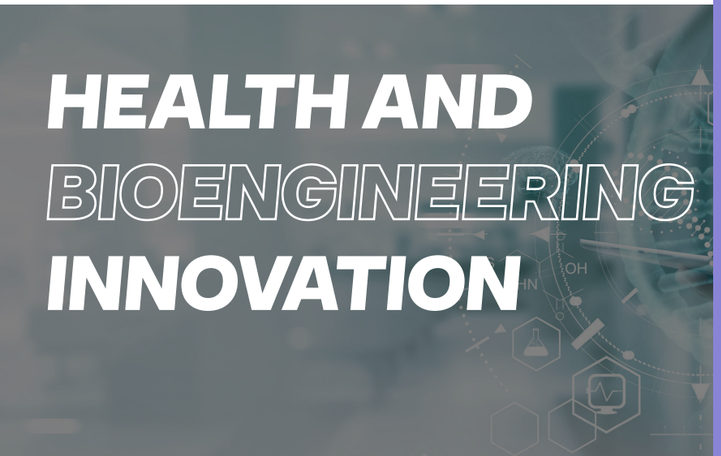
Innovation Goals

- Develop adaptive, additive, and hybrid manufacturing technologies delivering four industrial prototypes with ≥30% defect reduction and ≥20% performance gains by 2030
- Develop and deploy physics-constrained AI and digital twin frameworks, demonstrated through two operational digital twin systems for advanced manufacturing by 2030
- Enable scalable manufacturing of programmable and stimuli-responsive devices and micro-devices with up to 30% cost reduction and 50% operational lifetime improvement by 2030

Economies of the Future

KFUPM will achieve the following by 2030:

1. Development of four or more bio-digital technologies to predict, prevent, diagnose, monitor, and treat major diseases (cardiovascular, metabolic, oncological, musculoskeletal, neurological, and infectious) through biological simulation, physical restoration, point-of-care diagnostics, and AI-driven prediction



HEALTH AND BIOENGINEERING INNOVATION

Innovation Goals

- Develop an integrated VAD platform combining smart testing systems and cardiopulmonary simulation (phantoms, mock loops, and digital twins) to benchmark and optimize cardiac device performance for improved patient outcomes by 2030
- Establish a Computational Biology and Bioinformatics platform collecting clinically validated datasets from ≥5,000 patients across at least one major disease domain to enable AI-driven prediction and therapeutic optimization, while reducing healthcare costs by 15% within the study cohort by 2030
- Develop at least two point-of-care diagnostic devices and at least one AI-driven wearable or implantable solution capable of predicting, preventing, and continuously monitoring at least one major disease domain by 2030
- Develop energy-efficient, integrated, and miniaturized sensing and communication platforms and/or electronic systems to enable continuous remote health monitoring and sensitive, affordable screening of diverse biomarkers
- Develop a generative-design pipeline for patient-specific smart and passive biomaterials, implants, and prostheses integrating, advanced materials and anthropometric customization for affordable musculoskeletal restoration by 2030
- Utilize quantum-classical hybrid algorithms to simulate molecular docking for three priority viral or chronic disease targets, reducing the initial drug candidate screening time by 70% by 2030

Clean, Economic Hydrogen
IRC for Hydrogen Technologies and Carbon Management

Innovative Water Research
IRC for Membranes and Water Security

Industrial Robots
IRC for Intelligent Manufacturing and Robotics

Renewable Energy
IRC for Sustainable Energy Systems

Net Zero Emissions
IRC for Hydrogen Technologies and Carbon Management

Net Zero Aviation
IRC for Aviation and Space Exploration

Crude Oil-to-Chemical Conversion
IRC for Refining and Advanced Chemicals

Reuse of Materials and Products in Industry
IRC for Construction and Building Materials

New Space Leadership
IRC for Aviation and Space Exploration

Geoenergy Leadership
Center for Integrative Petroleum Research

Biodiversity
ARC for Environment and Marine Studies

FinTech
IRC for Finance and Digital Economy

EVs and EV Batteries
IRC for Sustainable Energy Systems

Cognitive Cities
IRC for Communication Systems and Sensing

Intelligent Manufacturing
IRC for Intelligent Manufacturing and Robotics

Nuclear Energy
IRC for Industrial Nuclear Energy

Automation of Logistics
IRC for Smart Mobility and Logistics

Health and Bioengineering Innovation
IRC for Bio Systems and Machines

Energy and Industrial Leadership
Sustainable Environment and Essential Needs
Economies of the Future
Health and Wellness

Dream Big
& Accomplish

for more
information