جامعة الفيصل
Alfaisal University

كلّية الهندسة
College of Engineering

AlfaisalX

Alfaisal Center of Excellence for Cognitive Robotics and Autonomous Agents

"Pioneering Cognitive Robotics and Autonomous Agents for Tomorrow."

Proposed by

Prof. Anis Koubaa

February 2025

AlfaisalX: Alfaisal Center of Excellence for Cognitive Robotics and Autonomous Agents

"Pioneering Robotics and Autonomous AI Agents Tomorrow."

Explain Acronym: Alfaisal is the name of the University, and X means Digital Transformation with GenAI and Robotics.

Introduction

The Cognitive Robotics and Autonomous Agents Center (AlfaisalX) is established to drive next-generation digital transformation through the convergence of robotics, unmanned aerial vehicles (UAVs), and agentic AI workflows. By integrating autonomous robotic platforms with intelligent, goal-driven AI agents, the center develops adaptive systems that can perceive, decide, and act across complex environments. This synergy enables breakthrough applications in logistics automation, smart manufacturing, precision healthcare, aerial monitoring, and business process transformation.

Aligned with Alfaisal University's strategic priorities, AlfaisalX serves as a premier hub for research, innovation, and industry collaboration. Its mission is to bridge academia and industry, fostering interdisciplinary work that accelerates the deployment of intelligent robotic systems in real-world settings. By focusing on robotics tightly coupled with agentic AI, RAAC will catalyze scalable automation solutions, strengthen Saudi Arabia's technological leadership, and contribute directly to the ambitions of Saudi Vision 2030 and beyond.

Vision and Mission

Vision: "Global leadership in Robotics, Autonomous Systems, and Agents."

To be an internationally recognized center in Robotics, Autonomous Systems, and Agentic AI, driving innovation, industrial transformation, and societal impact..

This vision supports Alfaisal University's aim to provide student-centric, world-class education, research, and innovation that contribute to serving society and achieving sustainable development.

Mission: "Innovating robotics and Agentic workflows for smarter industries and societies."

To advance Cognitive Robotics and Autonomous Agents through cutting-edge research, UAV innovation, and agentic AI workflows, delivering intelligent systems that transform industries, enable automation, and contribute to Saudi Vision 2030 and global progress.

This mission reflects the university's dedication to fostering transformative discoveries and innovation that benefit the university, the country, and the globe.

Objectives

1. Robotics & Autonomous Systems

- Design, integrate, and validate autonomous robotic platforms for self-driving cars, logistics, manufacturing, healthcare, and smart-city services.
- Advance **Cloud Robotics** for scalable deployment, fleet management, and real-time coordination.
- Develop **Agentic AI for Robotics** to enable autonomous decision-making, adaptive workflows, and human–robot collaboration.

2. UAVs & Aerial Autonomy

- Develop BVLOS-capable UAV solutions for inspection, mapping, security, and delivery.
- Build swarm coordination, resilient navigation, and edge-AI perception for long-range operations.
- Establish compliant testbeds and workflows supporting civil aviation regulations.
- Advance **UAV Agentic AI** for adaptive mission planning, autonomous decision-making, and coordinated multi-UAV operations.

3. Agentic AI Workflows & LLM-Based Agents

- Create **goal-driven multi-agent systems** that plan, coordinate, and execute end-to-end robotic workflows.
- Develop **Arabic-centric language and vision-language models** for human–robot teaming and regional applications.
- Build **Business Transformation Agentic Workflows** to automate complex enterprise processes and decision-making.
- Advance **Scalable Agentic Systems** through tool-use integration, simulation-to-reality transfer, and MLOps for reliable deployment at scale.

4. Industry Partnerships, Pilots & Commercialization

- Co-develop production pilots with government and industry to solve priority use cases.
- Accelerate technology transfer (IP, licensing, spinouts) and adopt open standards where beneficial.
- Quantify the ROI and environmental impact to support the outcomes of Saudi Vision 2030.

5. Education, Training & Workforce Development

- Deliver hands-on programs (robotics, UAV operations, agentic AI engineering) and professional certifications.
- Mentor capstones and graduate research are aligned with real industrial needs.
- Run hackathons and internships to build a national talent pipeline in autonomy and AI.

Core Research Areas

1. **Robotics & Autonomous Systems**
   Development of autonomous robotic platforms for logistics, manufacturing, healthcare, and smart cities, with a focus on cloud robotics, fleet coordination, and resilient perception–planning–control pipelines.
2. **UAVs & Aerial Autonomy**
   Advancement of UAV platforms with BVLOS capabilities, swarm intelligence, adaptive mission planning, and UAV agentic AI for coordinated multi-drone operations in inspection, delivery, and security.
3. **Agentic AI & Intelligent Workflows**
   Design of multi-agent systems and Arabic-centric LLM/VLM models to power robotic decision-making, human–robot teaming, and business transformation workflows, supported by scalable deployment and MLOps.
4. **Commercialization & Social Impact**
   Integration of ethical and secure autonomy frameworks, industry pilots, and technology transfer to deliver real-world solutions with measurable ROI and alignment to Saudi Vision 2030.

Strategic Initiatives

- **Flagship Research & Innovation:** Drive pioneering research in robotics, UAV autonomy, and agentic AI workflows, establishing Saudi Arabia as a leader in next-generation intelligent systems aligned with national and global priorities.
- **Robotics & Autonomous Systems Innovation Lab:** Establish a state-of-the-art facility for prototyping, testing, and validating robotic platforms, UAVs, and multi-agent AI systems, including cloud robotics and simulation-to-reality pipelines.
- **Industry Partnerships & Startup Ecosystem:** Forge strategic collaborations with industry leaders and government entities to co-develop real-world pilots, accelerate commercialization, and foster startups in robotics, UAVs, and AI-driven automation.
- **Talent Development & Workforce Readiness:** Deliver hands-on training programs, certifications, and hackathons in robotics, UAV operations, and agentic AI engineering, preparing the next generation of Saudi innovators and practitioners.
- **Outreach, Knowledge Sharing & Policy Impact:** Host conferences, publish high-impact research, and engage in global collaborations to shape thought leadership in robotics and AI, while contributing to ethical, safe, and standards-driven adoption.

Impact and Outcomes

- **Breakthrough Robotics & UAV Innovations:** Develop autonomous robotic platforms, UAV systems, and agentic AI workflows that transform logistics, manufacturing, healthcare, and smart-city services, enhancing regional and global capabilities.
- **Economic Growth & Startup Acceleration:** Foster robotics and AI-driven startups, strengthen industry-academic partnerships, and generate high-value jobs in autonomous systems, UAV technologies, and business process automation.
- **Academic & Research Leadership:** Position Alfaisal University as a global leader in robotics, autonomous agents, and UAV innovation, with world-class publications, patents, and international collaborations.
- **Societal & Industrial Transformation:** Deploy intelligent systems for precision healthcare, disaster response, sustainable urban development, and secure aerial monitoring, directly contributing to **Saudi Vision 2030** and global progress.

Alignment with Alfaisal University's Research Priorities

The **Cognitive Robotics and Autonomous Agents Center (AlfaisalX)** is dedicated to advancing Alfaisal University's strategic research priorities by focusing on robotics, unmanned aerial vehicles (UAVs), and

agentic AI workflows that drive industrial transformation and societal impact. The center emphasizes intelligent robotic platforms, scalable UAV autonomy, and multi-agent AI systems for both real-world operations and business process automation.

Complementarity with Existing Centers

- **Artificial Intelligence (AI) Center:** While the AI Center covers a broad spectrum of AI research, including robotics and machine learning, AlfaisalX specifically advances robotics, UAV autonomy, and agentic AI workflows tightly integrated with real-world deployment. This ensures distinction and complementarity, avoiding redundancy while strengthening the university's overall AI and robotics ecosystem.
- **Bioinformatics Initiatives:** Recognizing Alfaisal University's strengths in bioinformatics and genomics, AlfaisalX will contribute by applying robotics, UAVs, and AI workflows in smart cities, healthcare delivery, logistics, and industrial automation—fostering true interdisciplinary collaboration.

A potential concern in establishing AlfaisalX is the overlap with the university's existing Artificial Intelligence (AI) Center. While both are vital, they operate on fundamentally different paradigms, demand distinct infrastructure, and cultivate unique ecosystems of talent and partnerships. Creating a "track" inside the AI Center would fail to provide the dedicated resources and specialized environment essential for leadership in robotics and autonomous systems.

The distinction and necessity for AlfaisalX can be broken down into four core pillars:

1. Mission and Focus: Foundational Algorithms vs. Physical Systems Integration

- **The existing AI Center** focuses primarily on foundational and theoretical AI research, including machine learning algorithms, data science, and computational models. Its core output is often new models and software.
- **AlfaisalX:** Focuses on the **systems-level engineering and real-world deployment of intelligent physical systems**. Its mission is to integrate perception, planning, and control pipelines into hardware like robots, UAVs, and autonomous vehicles that operate in complex, unstructured environments. This is a challenge of hardware-software co-design, safety, and physical interaction, not just algorithms.

2. Infrastructure and Lab Requirements: Computing vs. Specialized Prototyping Environments

- **Existing AI Center:** Requires high-performance computing (GPU servers) and large datasets.
- **AlfaisalX:** Requires all of the above **plus** a suite of specialized, capital-intensive physical infrastructure that is irrelevant to a purely computational AI center. This includes:
    - A dedicated lab space of at least 150 sq. meters for hardware development.

- A
  Vicon Motion-Capture Arena for millimeter-accurate UAV tracking and swarm robotics research.
- Industrial robotic platforms, advanced sensor suites (LIDAR, RADAR), and a full electric vehicle for autonomous driving research.
- An innovation hub with 3D printers and fabrication tools for rapid prototyping.
  This specialized physical infrastructure demands dedicated management, safety protocols, and technical expertise that fall far outside the scope of a traditional AI center.

3. Talent and Core Expertise: Computer Science vs. Interdisciplinary Engineering

- **Existing AI Center:** Primarily recruits talent from computer science, machine learning, and data analytics.
- **AlfaisalX:** Requires a deeply interdisciplinary team of roboticists, mechatronics engineers, control systems specialists, embedded systems developers, and functional safety experts, *in addition* to AI researchers. This unique blend of expertise is necessary to solve challenges in physical automation and cannot be effectively cultivated as a small subgroup within a larger, software-focused center.

4. Industry Partnership Model: Data Collaboration vs. Hardware Co-Development

- **Existing AI Center:** Partnerships often revolve around data, software licensing, and consulting.
- **AlfaisalX:** Forges partnerships centered on co-developing physical prototypes. Our existing collaborations with
  Bako Motors (an EV manufacturer) and **HUMAIN** exemplify this model, requiring deep integration with their hardware and industrial workflows. A dedicated center provides a clear, credible interface for such industry partners who see Alfaisal as a serious hub for physical systems innovation.

Conclusion: A Synergistic, Not Competitive, Relationship

Far from creating redundancy, AlfaisalX is designed to be a synergistic partner to the AI Center. AlfaisalX will serve as the primary vehicle for **translating the foundational AI models** (some of which may be developed at the AI Center) **into robust, real-world autonomous systems**. By establishing a dedicated center, Alfaisal University will attract various funding streams (e.g., industrial automation, defense, logistics) and a distinct profile of engineering talent, thereby **expanding the university's overall research capacity and impact,** rather than competing for existing resources. The "administrative overhead" is a necessary investment to manage the unique safety, logistical, and infrastructural

demands of robotics research, which are essential for achieving the ambitious goals outlined in this proposal.

Focused Integration

AlfaisalX will integrate **Robotics, UAVs, and Agentic AI** to deliver transformative solutions across key national priority sectors:

- **Smart Cities:** Deploying AI-driven robotics and UAVs for urban mobility, public safety, and infrastructure management.
- **Logistics & Industry:** Enhancing supply chains and industrial operations through autonomous robots, UAVs, and adaptive AI workflows.
- **Healthcare & Precision Services:** Advancing robotic-assisted healthcare, aerial health monitoring, and intelligent service delivery systems.
- **Education & Workforce Development:** Implementing AI-powered personalized learning platforms, robotic teaching assistants, and UAV-based remote education tools to transform teaching and training.
- **Legal & Regulatory Innovation:** Supporting AI-driven compliance tools, autonomous system safety audits, and policy frameworks for responsible deployment of robotics, UAVs, and agentic AI systems.

- **Cultural & Societal Applications:** Leveraging AI agents and robotics to preserve, digitize, and promote regional heritage in alignment with Saudi Vision 2030.

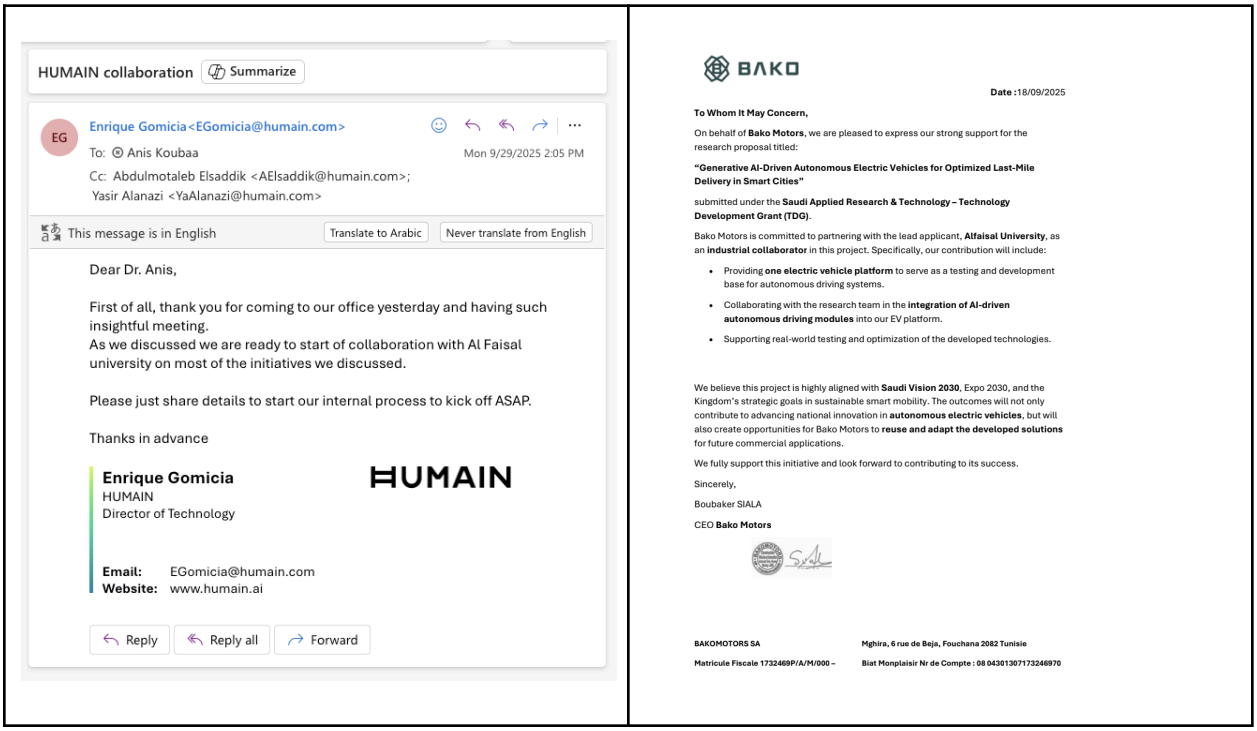
By aligning with Alfaisal University's **strategic research themes in Science & Technology, Health, Education, and Societal Innovation**, AlfaisalX will play a central role in advancing the university's mission to provide world-class education, research, and innovation that serve both the Kingdom and the global community.

Industrial Collaboration & Strategic Partnerships

AlfaisalX is uniquely positioned to leverage strong industrial collaborations, underscoring the national and global relevance of its research focus. Already, several leading companies have expressed their commitment to engage with the center:

- **HUMAIN (AI & Technology Solutions)** has confirmed readiness to collaborate on multiple initiatives in AI and robotics, accelerating knowledge transfer and co-development of industrial solutions.

- **Bako Motors (Electric Vehicle Manufacturer)** has formally pledged industrial support by providing a dedicated electric vehicle platform for research, development, and testing of autonomous driving technologies. They will further collaborate with the AlfaisalX team to integrate AI-driven autonomy modules and support real-world validation.



HUMAIN collaboration Summarize

EG Enrique Gomicia <EGomicia@humain.com>
To: Anis Koubaa
Mon 9/29/2025 2:05 PM
Cc: Abdulmotaleb Elsaddik <AElsaddik@humain.com>; Yasir Alanazi <YaAlanazi@humain.com>

This message is in English Translate to Arabic Never translate from English

Dear Dr. Anis,

First of all, thank you for coming to our office yesterday and having such insightful meeting.
As we discussed we are ready to start of collaboration with Al Faisal university on most of the initiatives we discussed.

Please just share details to start our internal process to kick off ASAP.

Thanks in advance

Enrique Gomicia
HUMAIN
Director of Technology

HUMAIN

Email: EGomicia@humain.com
Website: www.humain.ai

Reply Reply all Forward

BAKO

Date :18/09/2025

To Whom It May Concern,

On behalf of **Bako Motors**, we are pleased to express our strong support for the research proposal titled:

"Generative AI-Driven Autonomous Electric Vehicles for Optimized Last-Mile Delivery in Smart Cities"

submitted under the **Saudi Applied Research & Technology – Technology Development Grant (TDG)**.

Bako Motors is committed to partnering with the lead applicant, **Alfaisal University**, as an **industrial collaborator** in this project. Specifically, our contribution will include:

- Providing **one electric vehicle platform** to serve as a testing and development base for autonomous driving systems.
- Collaborating with the research team in the **integration of AI-driven autonomous driving modules** into our EV platform.
- Supporting real-world testing and optimization of the developed technologies.

We believe this project is highly aligned with **Saudi Vision 2030**, Expo 2030, and the Kingdom's strategic goals in sustainable smart mobility. The outcomes will not only contribute to advancing national innovation in **autonomous electric vehicles**, but will also create opportunities for Bako Motors to **reuse and adapt the developed solutions** for future commercial applications.

We fully support this initiative and look forward to contributing to its success.

Sincerely,

Boubaker SIALA

CEO **Bako Motors**

BAKOMOTORS SA **Mghira, 6 rue de Beja, Fouchana 2082 Tunisie**

Matricule Fiscale 1732469P/A/M/000 – **Biat Monplaisir Nr de Compte : 08 04301307173246970**

These collaborations highlight the **industrial trust in AlfaisalX's vision** and the **urgency of establishing the center**. They demonstrate that industry is not only receptive but actively seeking to partner with Alfaisal University to address critical challenges in robotics, UAVs, and AI-driven automation.

The industrial commitments also ensure that AlfaisalX will:

- Deliver **real-world impact** by translating academic research into applied, industry-ready solutions.
- Strengthen Saudi Arabia's leadership in **autonomous systems** and **AI robotics**, fully aligned with **Vision 2030 goals**.
- Create **sustainable pathways for commercialization, patents, and spin-offs**.

These partnerships are a clear indication that the establishment of AlfaisalX is both timely and essential to meet national priorities and global competitiveness.

External Funding Momentum and Strategic Impact

AlfaisalX is already demonstrating the strategic value and national impact that justify its establishment as a Center of Excellence. Despite not yet being formally launched, our teams have **secured highly competitive research grants** and **attracted industrial partners**, proving both capability and demand for the center's vision.

Most notably, Alfaisal University won an **industry-funded grant from Tawuniya**, one of the Kingdom's largest insurance companies, to develop a *Generative AI-Powered Multilingual Chatbot for Patient Engagement and Claims Processing*. This project addresses strategic national healthcare priorities by automating medical record generation, fraud detection, and billing compliance. With a **1.6% acceptance rate across all Saudi universities**, this award positions Alfaisal among the most competitive and innovative institutions in Generative AI applications for health and insurance—areas directly tied to Saudi Vision 2030's objectives in digital health and financial efficiency.

In parallel, Alfaisal University secured a **defense research grant from PSDSARC** for the *U-SCAR UAV Surveillance System*. This project develops AI-powered multimodal detection (vision and sound) for real-time drone monitoring, contributing directly to the Kingdom's defense, security, and emergency response capabilities. Beyond advancing national security, this grant also reflects Alfaisal's role in cultivating next-generation talent, as the project is student-led and strengthens our pipeline of highly skilled Saudi engineers.

Further, AlfaisalX has **submitted proposals exceeding SAR 4 million** in potential funding (PSDSARC + RDIA). This pipeline demonstrates scalability and the clear opportunity to attract multi-million riyal projects once the center is formalized.

Together, these achievements prove that AlfaisalX is not aspirational but already delivering tangible outcomes. By institutionalizing the center, Alfaisal University will consolidate its role as a **strategic national partner in robotics, UAVs, and AI**, elevate its global research reputation, and ensure alignment with Saudi Vision 2030's ambition for technological leadership and economic diversification.

Student Engagement Initiatives

The Cognitive Robotics and Autonomous Agents Center (AlfaisalX) is committed to engaging students in cutting-edge research, innovation, and professional development. The center ensures students gain

hands-on experience in robotics, UAV autonomy, and agentic AI workflows, preparing them to lead the future of intelligent systems.

Mentoring Student Research & Capstone Projects

Faculty and researchers will mentor students on robotics, UAVs, and agentic AI-related projects that address real-world industry challenges. Projects will align with Saudi Vision 2030, focusing on autonomous systems, smart cities, precision healthcare, and business transformation through AI-driven automation.

Graduate Studies & Research Support

Graduate students will access robotics and UAV labs, simulation environments, and cloud robotics platforms for advanced research. Support will be provided for theses and dissertations in robotics, multi-agent AI systems, and UAV autonomy.

Research Publications & Skills Development

Students will co-author papers in top-tier robotics, AI, and autonomous systems venues. Training workshops will cover agentic AI methodologies, robotics software (ROS2), UAV systems, and technical publishing.

Innovation & Prototyping Infrastructure

The center will function as a Robotics & UAV Innovation Hub, providing platforms such as drones, mobile robots, embedded systems (Jetson, Raspberry Pi), and AI cloud resources. Students will receive support for prototyping robotic solutions and developing proof-of-concept projects.

Internships & Industry Collaboration

We has already begun attracting **international student interest**, such as a recent request from the **French Air and Space Force Academy** for a six-month final-year internship in UAVs and defense-related robotics. This validates AlfaisalX's reputation as a global destination for talent development. The center will also facilitate internships and joint projects with leading robotics, UAV, and AI companies, connecting students with industry mentors and real-world deployment opportunities.

Through these initiatives, AlfaisalX will cultivate a new generation of robotics and AI innovators, equipped with technical expertise, research excellence, and an entrepreneurial mindset to advance academia, industry, and national priorities.

"End of studies project" internship from the French Air and Space Force Academy Summarize

EL Elias Laroussi<elias.laroussi@ecole-air.fr>

To: Anis Koubaa Sun 9/28/2025 1:01 PM

You forwarded this message on Sun 9/28/2025 10:37 PM

This message is in English Translate to Arabic Never translate from English

Resume Elias Laroussi.pdf 4 MB

2026_Fiche SFE CMEA SI.doc 93 KB

2 attachments (4 MB) Save all to OneDrive - Alfaisal University Download all

Dear Mr. Koubaa,

I am Second Lieutenant Elias Laroussi from the French Air and Space Force Academy, and I am interested in doing my final-year internship at AlFaisal University, from January 19, 2026 to June 12, 2026.

Indeed, I would like to complete my "end of studies project" internship linked to aerospace and/or defence (including UAVs) at AlFaisal University.

Besides, I am fully supported financially by my academy.

Therefore, I would like to know which projects you are currently working on and where I may contribute to these projects.

You can find my resume attached and a document which explains the objective of the internship. I remain at your disposal should you have any questions.

Best regards,
2d Lt Laroussi - French Air and Space Force Academy
elias.laroussi@ecole-air.fr

L'AIR & DE L'ESPACE
SALON-DE-PROVENCE

Funding Roadmap

To establish a sustainable funding model for the **AlfaisalX**, it's essential to align financial projections with the infrastructure and support provided by Alfaisal University. Leveraging the university's existing resources will enhance the center's capabilities and attractiveness to potential sponsors and collaborators.

1. Government Grants and Funding Opportunities:

- **Research, Development, and Innovation Authority (RDIA) Grants:**
    - *Saudi Basic Science Initiative*: Target grants support fundamental research in health, sustainability, and future economies. Potential funding of up to **SAR 1.6 million** per project over a three-year period.
    - *Saudi Applied Research and Technology (SART) Initiative*: Focus on advancing prototypes to development stages, with grants up to **SAR 20 million** over five years.
- **Saudi Data and Artificial Intelligence Authority (SDAIA):**
    - *AI Research and Development Programs*: Collaborate on AI projects aligned with national priorities, with potential substantial funding based on project scope.

2. Training Services:

- **Professional Development Programs:**
    - Offer specialized workshops and certification courses in Generative AI and Robotics. Charging **SAR 5,000** per participant, aiming for 80 participants annually, could generate **SAR 200,000**.
- **Educational Partnerships:**
    - Collaborate with government institutions to provide tailored training programs, potentially securing contracts worth **SAR 500,000** annually.

3. Research and Development (R&D) Collaborations with Companies:

- **Industry-Sponsored Research:**
    - Engage in applied research projects that tackle critical industry and government challenges. Securing three projects annually, each with SAR 1 million in funding, could generate SAR 3 million in revenue. Achieving this goal will **require strong collaboration with the Technology Transfer Office** to effectively identify opportunities, secure funding, and drive impactful research.

4. Government Relations:

- **Saudi Data and Artificial Intelligence Authority (SDAIA):** Align research projects with national AI strategies to secure government support and funding, with financial backing depending on project relevance and strategic alignment. The **Technology Transfer Office (TTO)** plays a crucial role in facilitating partnerships, ensuring project proposals meet national priorities, and streamlining the funding process.
- **Saudi Company for Artificial Intelligence (SCAI):** Collaborate with SCAI to develop AI-driven solutions that address national priorities, leveraging their resources and expertise for mutual benefit. The **TTO** will act as a bridge to negotiate agreements, structure partnerships, and maximize the impact of these collaborations, ensuring successful technology commercialization and implementation.

7. Intellectual Property (IP) and Licensing:

- **Patent Development:**
    - Encourage researchers to patent innovations, creating a portfolio of IP assets.
- **Licensing Agreements:**
    - Negotiate deals with companies interested in commercializing technologies developed at AlfaisalX, generating ongoing revenue streams.

AlfaisalX aims to establish a robust financial foundation that supports its mission of advancing Generative AI and Robotics while contributing to Saudi Arabia's economic growth and technological leadership.

Governance and Leadership Structure of AlfaisalX

To ensure effective management, strategic decision-making, and operational efficiency, **AlfaisalX** will be governed by a structured leadership team comprising **academic researchers, engineers, developers, and administrative personnel**. The governance model follows a **hierarchical structure** with clearly defined roles and responsibilities.

1. Leadership Team

AlfaisalX Director – Prof. Anis Koubaa

- Provides overall strategic direction and vision for the center.
- Leads partnerships with **government agencies, industries, and academic institutions**.
- Oversees research, funding initiatives, and commercialization efforts.
- Represents AlfaisalX in national and international AI and robotics forums.

2. Core Team Members

We will invite Alfaisal University faculty members, mainly from the College of Engineering and Advanced Computing, and also open to other Colleges interested in multi-disciplinary research, to join the Center and benefit from its resources. The following are the faculty who committed to participating in the center's activities:

- Dr. Asem Alakee (Robotics and UAVs)
- Dr. Mohamed Bahloul (Health Robotics)
- Dr. Driss Benhaddou (Network Centric built environment)

3. Research and Development Labs

Each unit is responsible for specific research domains and technical advancements, ensuring focus and depth in core research areas.

A. Agentic Workflows for Business Automation Unit

Focus: Development of **Generative AI, Large Language Models (LLMs), AI Agents**, and Arabic-centric AI.

- **Lead Researcher**: (Oversees AI-driven research & projects).
- **Assistant Researchers**: **(TBD)** (Supports model training, dataset preparation, and experiments).
- **Research Engineers**: **(TBD)** (Develop AI models, optimize LLMs, and work on AI-based applications).

B. Robotics, Drones, & Autonomous Systems Unit

Focus: AI-powered **robotics, UAV technology, and autonomous systems** for smart cities, logistics, and security.

- **Lead Researcher**: **(TBD)** (Expert in robotics, UAVs, and AI integration).
- **Assistant Researchers**: **Eng. Khaled Jabr** (Supports UAV research, software, and AI navigation).
- **Research Engineers**: **(TBD)** (Develop control algorithms, UAV perception, and robotics AI integration).

C. Software Development Unit

Focus: Development of **AI applications, AI-powered platforms, and user interfaces** for Generative AI & Robotics.

- **Front-End Developer (Web)**: Designs and implements user-facing interfaces for AI-powered applications.

- **Back-End Developer (Web)**: Manages API integration, AI model deployment, and system scalability.
- **Mobile App Developer (Flutter)**: Develops mobile applications that integrate AI and robotics solutions.

3. Administrative and Operational Units

To ensure the smooth operation of AlfaisalX, the following key roles support data-driven decision-making and public engagement.

A. Administrative Support & Data Analytics Team

Focus: Internal operations, financial planning, compliance, and research impact measurement.

- **Data Analytics Employee**: Analyzes research outcomes, funding trends, and AI adoption metrics.
- **Financial and Grants Coordinator (TBD)**: Assists in managing grants, industry sponsorships, and reporting.

B. Media & Outreach Team

Focus: Branding, outreach, and public engagement to promote AlfaisalX's research and impact.

- **Media Design Employee**: Handles graphic design, digital content, and promotional materials.
- **Event & Communications Specialist (TBD)**: Organizes AI events, hackathons, and research dissemination.

Operational Funding Requirements

- **Dedicated Lab Space:** A fully equipped **research lab of at least 150 sq. meters** to support AI, robotics, and autonomous system development.
- **High-Performance Computing Infrastructure:**
    - **GPU Servers & Machines** for deep learning, large-scale AI model training, and simulations.
    - **Laptops and Workstations** for AI research and software development.
- **Robotics & UAV Platforms:**
    - **Autonomous robotic platforms** for industrial, logistics, and human-robot interaction studies.

    - **Unmanned Aerial Vehicle (UAV) systems** for AI-driven aerial automation and surveillance.
- **IoT & Embedded Systems:**
    - **Jetson Orin Nano, Raspberry Pi 5 and above** for edge AI applications.
    - **Microcontrollers and embedded platforms** for AI-embedded system research.
- **Advanced Sensor Suite:**
    - **Cameras (RGB, Thermal, Hyperspectral), LiDAR, Laser Scanners, IMUs, GPS, and RADAR** for AI perception and environment mapping.
- **Operational & Cloud Computing Budget:**
    - **Regular funding allocation** for operational expenses, including software licenses, cloud computing (Google Cloud, AWS, DigitalOcean, OpenAI, Claude, CursorAI), and AI service subscriptions.
- **AI Research & Development Fund:**
    - Dedicated **annual research grants** for developing **Arabic LLMs, generative AI applications, robotics autonomy, and AGI research**.
- **International Collaborations & Mobility Fund:**
    - Support for **visiting researchers, faculty exchanges, and participation in global AI & robotics conferences.**
- **Rapid Procurement Process (necessary):**
    - Streamlined procedures for **quickly acquiring AI tools, robotics components, and cloud-based AI services** to support agile research and development.

Annual Reporting and Success Evaluation Metrics

To ensure transparency, accountability, and continuous improvement, **AlfaisalX** will publish an **Annual Report** that evaluates the center's progress based on **Key Performance Indicators (KPIs)** across **research, funding, education, industry collaboration, and impact**.

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1. Annual Report Structure

Executive Summary

- Overview of key achievements, significant projects, and strategic progress.

- Summary of financial status and funding utilization.

Research & Innovation Performance

- Publications, patents, and technical breakthroughs in **Generative AI, LLMs, Robotics, and UAVs**.
- Research contributions to **Saudi Vision 2030** and global AI advancements.

Funding & Financials

- Overview of grants secured (**RDIA, SDAIA, SCAI, private industry**).
- Revenue from **training services, AI consulting, R&D contracts, and licensing agreements**.

Education & Student Engagement

- Student research projects, theses, and **capstone projects mentored**.
- Student involvement in **conferences, publications, and competitions**.
- Training programs and AI certifications delivered.

Industry & Government Collaboration

- Partnerships with **corporate, government, and startup ecosystems**.
- AI prototypes deployed for **logistics, smart cities, and automation**.
- Impact on **industrial AI adoption and workforce development**.

Ethical AI & Responsible Deployment

- Implementation of **AI ethics frameworks and bias mitigation strategies**.
- Governance models for **safe AI and AGI** development.

Operational & Infrastructure Growth

- Expansion of **AI computing resources, robotics labs, and UAV platforms**.
- New faculty, researchers, and an administrative team expansion.

Key Performance Indicators (KPIs) for AlfaisalX

These KPIs are achievable upon securing the **requested equipment resources** and ensuring a **sufficient number of full-time researchers**. Without these foundational elements, reaching the targets may be significantly constrained.

Category	KPI	Target (Annual)

Research & Publications	Number of research papers published in top-tier journals/conferences	10+ per year
	Number of patents filed and approved	1-2 per year
	AI datasets and models published as open-source	At least 3 per year
Funding & Revenue	Total external funding secured (RDIA, SDAIA, SCAI, Industry)	At least 1.5 M per year
	Revenue from AI consulting and R&D projects	Estimated +500K per year
	Training & certification income	SAR 100K+ per year
Education & Student Engagement	Number of student projects, theses, and capstones mentored	5+ per year
	AI and robotics training workshops conducted	2 per year
Industry & Government Engagement	Corporate R&D collaborations	2 per year
	Number of AI-driven industrial applications deployed	2 per year
Infrastructure & Growth	Computational resources added (GPUs, robotics, UAVs)	Incremental upgrades annually

	Number of new researchers and faculty recruited	2-3 per year

These KPIs will be reviewed quarterly and reported annually in the AlfaisalX Annual Report to track progress, optimize resource allocation, and ensure strategic alignment with Alfaisal University's research priorities.

Research Projects and Institutional Collaboration

AlfaisalX is actively engaged in pioneering research collaborations that bridge academia and industry to develop cutting-edge AI and robotics solutions. One of the key projects under development is the following:

Potential Industry Project Proposal

Development of an Autonomous Electric Vehicle for Delivery Services

Overview

This project focuses on the design, development, and deployment of an **Autonomous Electric Vehicle (AEV)** tailored to Saudi Arabia's logistics and delivery ecosystem. Conducted in collaboration with **Bako Motors (Tunisian electric vehicle manufacturer)** and **Jahez Company**, this initiative aims to integrate advanced robotics, AI, and autonomous systems to revolutionize last-mile delivery services.

Bako Motors has expressed a strong interest in this initiative and has committed to providing **a full electric vehicle** to Alfaisal University to serve as a research platform for this project. Additionally, Bako Motors will approach **Jahez** for funding support, and we have established a direct connection with Jahez's **COO** to explore further collaboration opportunities.

Project Objectives

- **Develop an Autonomous Electric Vehicle Platform**
    - Integrate AI-based perception and control systems into the electric vehicle provided by Bako Motors.
    - Utilize **ROS2** for modular and scalable software architecture.
- **Enhance Logistics and Delivery Automation**
    - Build a fully autonomous delivery system for Jahez to optimize last-mile delivery.
    - Automate logistics processes such as **route planning, fleet management, and scheduling**.
- **Customization for Saudi Arabia**

    - Adapt AI navigation systems to **high temperatures, traffic conditions, and road infrastructure**.

- **Industry Partnerships & Commercialization**
    - Foster innovation-driven collaboration between **Jahez, Bako Motors, and AlfaisalX** to explore commercialization opportunities.

Project Phases & Timeline

Phase	Activities	Duration
Phase 1: Planning & Design	Define system requirements, select sensor suite, and design software architecture	Months 1–3
Phase 2: Hardware Integration	Install sensors, compute units, and actuators into the Bako Motors electric vehicle	Months 4–9
Phase 3: Software Development	Develop **ROS2-based modules** for perception, localization, and path planning	Months 10–18
Phase 4: Testing & Deployment	Conduct controlled tests and deploy pilot vehicles with Jahez for real-world validation	Months 19–24
Phase 5: Optimization & Commercialization	Refine AI models, improve system efficiency, and develop a commercialization strategy	Months 25–36

Through this collaboration, **AlfaisalX aims to drive innovation in AI-powered logistics, enabling the transition to smart, autonomous, and sustainable delivery solutions for Saudi Arabia**.

Proposed Budget Structure for AlfaisalX

1. Estimated Setup Budget (One-Time, Year 1)

These are capital expenditures required to establish the center.

Category	Estimated Cost (SAR)	Rationale
Lab Space Setup (150 sqm)		Renovation, furnishing, safety & compliance.
High-Performance Computing	150K - 1200 K	H100/RTX4090 GPU servers, storage, and networking for AI/robotics workloads.
Robotics & UAV Platforms	200K-600K	Industrial robots, drones (UAVs), and mobile platforms for R&D.
Vicon Flying Arena (10×10 m) Motion-Capture System	400K-700K	10×10 m motion-capture arena with 12–16 Vicon cameras, software license, calibration tools, networking, and installation. Enables millimeter-accurate UAV tracking, multi-drone autonomy testing, and AI dataset generation in a controlled research environment.
IoT & Embedded Systems	100K - 250K	Jetson, Raspberry Pi, microcontrollers for edge AI.
Advanced Sensor Suite	100K - 200K	LiDAR, RADAR, RGB/thermal cameras, IMUs, GPS, hyperspectral sensors.
Software & Cloud Licenses	30K annual	Cloud computing (AWS, GCP), robotics middleware (ROS2), and AI APIs.
Innovation & Prototyping Hub	100K	3D printers, fabrication tools, and an electronics lab setup.

International Collaboration Fund	50K - 200K annual	Hosting visiting researchers, exchange programs.
Contingency (10%)	200K	Flexibility for procurement and unplanned needs.
Total Initial Setup	**Starting 1350K SAR**	

2. Annual Operational Budget (Recurring)

These cover staff salaries, maintenance, and continuous research activities.

Category	Estimated Annual Cost (SAR)	Rationale
Faculty & Researchers	500K-1500K	Salaries for PI, researchers, 3–4 research engineers.
Postdoctoral Fellow (University support)	— (covered by University)	Included as in-kind support, not requested in the budget.
Graduate Research Assistants	100K	Support for visiting master's and PhD students (scholarships + stipends).

Administrative & Technical Staff	200K	One administrator with data science background, one marketing specialist
Operational Expenses	150K	Utilities, consumables, and maintenance of robotics/UAV equipment.
Software & Cloud Subscriptions	50K	Annual cloud compute, AI services, robotics software.
Research & Development Fund	100K	Competitive seed grants for faculty/student projects.
Travel & Conferences	100K	Faculty, researchers, and students are presenting globally.
Industry Engagement & Events	50K	Hackathons, workshops, outreach events.
Contingency (10%)	100K	Buffer for unforeseen expenses.
Total Annual Operational Budget	**1350K**	—

Budget Justification

The proposed budget structure for AlfaisalX is designed to ensure the successful establishment and sustainable operation of a world-class research and innovation hub in Robotics, UAVs, and AI-driven autonomous systems.

The **initial setup budget** focuses on building critical infrastructure that enables cutting-edge research. The investment in **high-performance computing (SAR 150K–1.2M)**, including H100/RTX 4090 GPU servers and storage systems, is essential for large-scale training of AI models, robotics perception pipelines, and UAV autonomy simulations. Complementary investments in **robotics platforms (SAR 200K–600K)** and **advanced sensor suites (SAR 100K–200K)** will provide the hardware backbone for prototyping autonomous drones, industrial robots, and healthcare robotics applications. The inclusion of an **IoT and embedded systems budget (SAR 100K–250K)** ensures that edge-AI capabilities can be tested and deployed in real-world scenarios. At the same time, **software, prototyping tools, and collaboration funds** guarantee agility, innovation, and global integration.

The **annual operational budget (SAR 1.35M)** ensures the sustainability of this ecosystem. Faculty, researchers, and graduate assistants form the intellectual capital of the center, while administrative and technical staff guarantee smooth operations and outreach. Annual allocations for **R&D funds, cloud services, international conferences, and industry engagement** ensure that the center remains at the forefront of research and maintains strong visibility in the global robotics and AI community.

Strategically, this investment will accelerate innovation in **drones and AI robotics**, areas of direct national relevance. UAV autonomy impacts logistics, urban mobility, and aerial monitoring, while robotics and agentic AI directly address industrial automation, healthcare delivery, and smart-city services. By bridging academia, government, and industry, AlfaisalX will pioneer Saudi Arabia's leadership in robotics and AI, producing high-impact research, training national talent, and fostering commercialization opportunities aligned with Vision 2030.

This budget is lean yet strategically impactful, ensuring maximum return on investment through breakthrough innovations, global recognition, and societal transformation.

Conclusion

The **Cognitive Robotics and Autonomous Agents Center (AlfaisalX)** represents a transformative initiative that reinforces Alfaisal University's mission of innovation and excellence. By focusing on **robotics, UAV autonomy, and agentic AI workflows**, the center will advance scientific knowledge, accelerate industrial transformation, and address critical societal needs.

Through cutting-edge research, real-world pilots, and strategic partnerships, AlfaisalX will serve as a cornerstone of the university's research and innovation ecosystem—bridging academia and industry while shaping the future of autonomous systems in Saudi Arabia and beyond.

This proposal seeks approval and support to establish AlfaisalX as a premier hub for **robotics, UAVs, and intelligent agents**, positioning Alfaisal University as a global leader in autonomy, intelligent automation, and AI-driven business transformation.

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