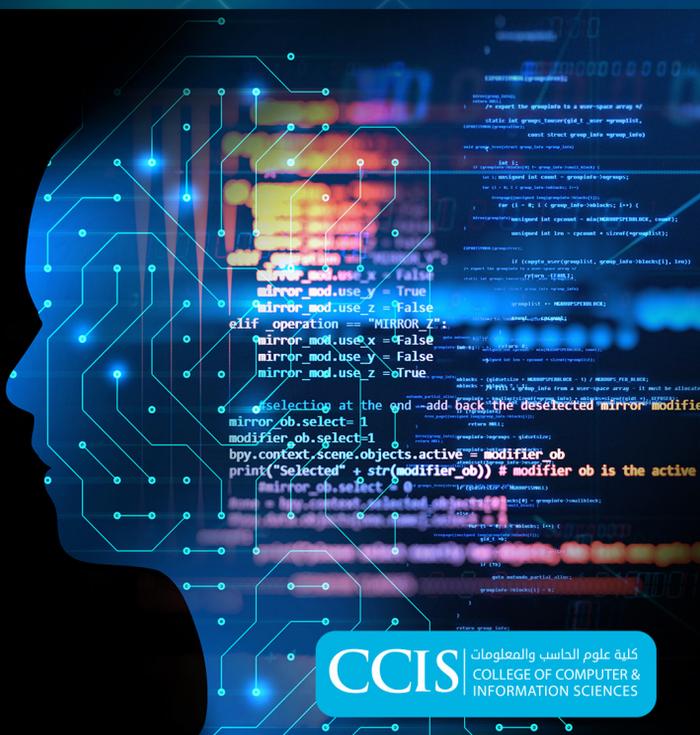


# EMERGING INTELLIGENT AUTONOMOUS SYSTEMS

# E.I.A.S DATA SCIENCE & *BLOCKCHAIN* LAB



The background features a large, semi-transparent image of a robotic hand with a glowing green palm. The hand is positioned as if holding a glowing blue globe. The background is filled with faint, glowing blue and white lines and shapes, suggesting a digital or futuristic environment. The overall color palette is light blue and white, with accents of green and yellow.

**EMERGING INTELLIGENT  
AUTONOMOUS SYSTEMS**

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# EMERGING INTELLIGENT AUTONOMOUS SYSTEMS

## E.I.A.S DATA SCIENCE & BLOCKCHAIN LAB

### VISION

Become the PSU and Region Icon in terms of innovation and research impact.

### MISSION

Innovate and establish a conducive innovative research environment through which cutting edge innovative research is conducted and disseminated in line with national strategies and international emerging trends.

### PHILOSOPHY

EIAS is a responsive agile open-for-all umbrella research lab that copes and adapts to the dynamics of information technology and the corresponding society needs. Members work in teams to perform applied and theoretical research in focus areas as per “cycle” and priorities.

### OBJECTIVES:

- Conduct cutting edge research based on national needs and international trends.
- Publish and disseminate research results using distinguished venues.
- Attract funds and generate income to support research & development)
- Disseminate knowledge through workshops and training courses.
- Establish innovative platforms and communication channels to interact with the society and promote innovation.
- Promote innovation and encourage wide participation of faculty and students.
- Establish national and international collaboration channels with organizations and individuals.
- Provide consultations for organizations, companies and the community at large

## TRACKS FOR THE CURRENT CYCLE:

- Blockchain and Decentralized Autonomous Systems.
- Data Science, Mobility and the intelligent Cloud.
- Intelligent Systems and Deep Learning.
- Mixed Reality, HCI and Holography.
- e-Leadership and e-Quality.
- Natural Language Processing, including Speech Recognition (NLP)

## MEMBERSHIP:

Permanent Membership (Actual Names will be added later) • The Blockchain Team.

- The Data Science, Computer Vision & Image Processing Team.
- Intelligent Cloud Team.
- NLP, Bots and Intelligent Assistants Team.
- Mixed Reality, HCI and Holography Team.
- e-Leadership and e-Quality Team.

## WHAT IS IT IN THE NAME?

- Emerging: “Emergence” and innovation are the norm in Information Technology. New technologies and ideas are emerging around the clock with deep impacts on all aspects of life. Researchers should always be at the edge.
- Intelligent: Artificial Intelligence is becoming a mainstream approach for building modern systems. Most of the systems we are using today are based on AI technologies.
- Autonomous: Autonomy is the “fashion” of the age: embedding business and operational rules in the software. A good example is blockchain. The system works without centralized control, administration or human intervention.
- Systems: system theory and complexity science are dominating the scene in the knowledge era. The national interplay between “complexity systems” and “Information Technology” is surprising.
- Blockchain: An excellent current, hot example of emerging systems: A new application development platform for building Decentralized Autonomous Valuegenerating applications. Extremely secure and reliable – the basis for the “Value Web” and “Web 3”.

## INTRODUCTION:

Information technology is fast transforming the world into a large e-Village. Innovative technologies and ideas are emerging around the clock. IT companies are competing and investing to turn these ideas and technologies into real life products and systems that are deeply impacting the way we live, the way we work, the way we learn, the way we travel, the way we innovate, the way we create businesses, the way we lead, ..... name it and there is an e- prefix for it. Interestingly, the field itself is very dynamic in terms of knowledge, platforms, skills and is fast swallowing and encroaching other fields. Look at e-Commerce, Autonomous Systems, Self-Driving cars, which are now owned and developed by IT Companies. The Self-Driving car is just a new type of computer, like the PC, but with a different operating system and a different setup.

What we are seeing and witnessing comes into the shape of innovation cycles and epochs. The pillars of the latest epoch include:

- Applied artificial Intelligence (AI): where, for the first time in history researchers were able to develop AI systems that are extremely accurate and precise with different sensitive applications in many areas from search, speech recognition to the remote execution of highly sensitive medical operations. One of the amazing outcomes of AI research is holography.
- Intelligent Cloud and Data Science: Where the provided techniques and pooled computing power made it possible to generate higher orders of knowledge and information. Combined with mobility, these technologies are creating wonders and paving the way for innovative enterprises and businesses.
- Deep Learning: where some of the earlier techniques in machine learning are re-emerging and evolving as efficient approaches to handle the huge amounts of data generated in the “Big Data” era.
- Decentralized Autonomous Computing System Paradigm: This is an interesting new technology that emerged with the invention of Bitcoin and cryptocurrency systems and is fast evolving into a full application development platform.
- All these areas are quite relevant to KSA 2030 vision, which heavily concentrates on the cultivation of new emerging digital technologies to drive development and economic growth.

## RESEARCH AREAS:

### **Track-1: Decentralized Autonomous Systems and Blockchain:**

The invention of Bitcoin, followed by other similar crypto-economy platforms brought with it a new distributed computing paradigm that proved to be very useful in many areas. The technology is codenamed “Blockchain”, based on the underlying distributed data structure. With the emergence of Ethereum as a full distributed virtual computer and development platform, it is clear that Blockchain is evolving into a new platform with potential applications in many areas. The technology has been endorsed by all major tech companies such as IBM, Microsoft, SAP and others. Blockchain is creating a lot of “buzz” in financial and business markets. Our research will concentrate on further developing the technology and applying it in many business and enterprise areas. In addition, the lab will provide many services to help organizations adopt the technology to build innovative systems.

### **Track2: Data Science, Mobility and Big Data and Intelligent Cloud**

With the explosion of data and information in the knowledge era, many organizations are competing to extract and mine the “gold” hidden data. A lot of research is being conducted in the new emerging “Data Science” field. Coupled with cloud and mobility technologies, this led to the emergence of unique agile platforms that are reshaping and redefining business and enterprise structures and approaches. Most of the work done in this area is based on the intelligent cloud infrastructures (sort of higher order cloud systems that provide technologies and techniques to handle complex information).

Research in this area will concentrate on promoting the core technologies and models, while innovatively applying these technologies to relevant areas. Most of the research in this area will be problem-driven.

### **Track 3: Intelligent Systems and Deep Learning:**

Most of the modern AI systems rely heavily on deep learning technologies. The field of deep learning is strongly based on neuro-science, and recent developments show that it has been effective in providing short-cut solutions to complex problems.

Already, some of our teams are applying the technology to solve problems in areas of image recognition and NLP.

### **Track 4: Mixed Reality, HCI and Holography:**

This is an emerging area that will have deep impacts on human computer interaction, collaboration, learning, mobility and other areas of life. The possibilities are huge, limited only with our imagination. Some of our teams are already working in the area of HCI. Research in this area will be need-based and problem-driven. As many organizations in KSA are looking forward to apply this technology, the lab will be fore and front in exploring the possibilities and providing the required support.

### **Track 5: Natural Language processing and Chat Bots:**

Recent advances in computing technology boosted research and development in the area of natural language processing (NLP). This led to the appearance of many intelligent applications in the area of NLP such as chatting Bots, Speech Recognition Systems, and Intelligent Assistants such as Cortana and Siri. Research in this track will concentrate on contributing to the on-going efforts to improve accuracy and performance, with special emphasis on Arabic.

### **Track 6: Computer Vision & Image Processing:**

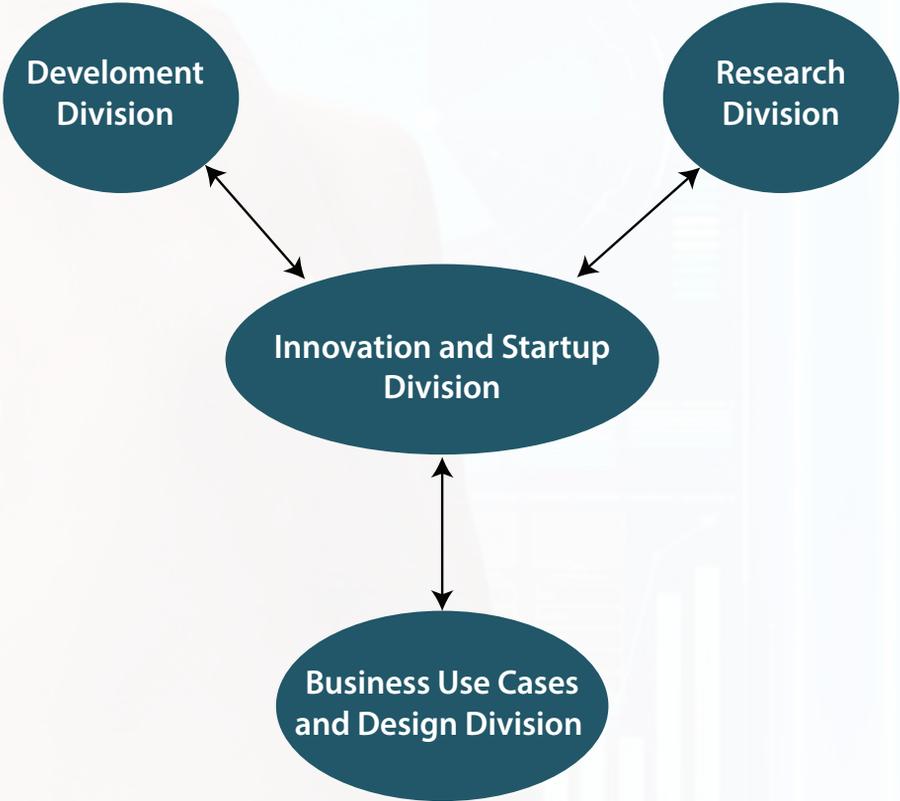
Image processing and computer vision are becoming major components of many current applications. This is in line with the on-going transformation from traditional text-based computing models to the more intelligent digital media computing models. Research in this area will focus on building accurate and efficient models that can be used to build applications at the domestic and international levels.

### **Track 7: e-Leadership and e-Quality:**

The natural interplay between “Complexity Systems” and “Advanced Information Technology” is giving rise to new models of leadership and quality management in private and public organizations. Research in this area will focus on new e-Complex models for leadership and Quality Management.

**LAB STRUCTURE.**

**LIAS**



## **CAPACITY BUILDING AND PROFESSIONAL DEVELOPMENT:**

EIAS DSB will be offering Certification Programs in four areas

### **A- Certificate in Blockchain Development Consists of three modules:**

- 1- Foundations of Blockchain Systems
- 2- Blockchain Development: Ethereum
- 3- Blockchain Development: Hyper Ledger

### **B- Certification in Blockchain Business Applications**

#### **Consists of two modules**

- 1- Foundations of Blockchain Systems
- 2- Creating Business Use Cases for Blockchain 3- Advanced Applications and Case Studies

### **C- Certification in Applied Deep Learning**

#### **Consists of three modules**

- 1- Introduction to Machine Learning
- 2- Deep Learning 1: Basic concepts, development platform and simple applications
- 3- Advanced applications and case studies

### **D- Bid Data Analytics and Hadoop**

#### **Consists of three modules**

- 1- Foundations and Concepts of Bid Data Analytics
- 2- Cloud Computing and Big Data
- 3- Bid Data Analytics using Hadoop

