

Module 1 Introduction Intelligence system

Intelligent Systems in AI

Intelligent systems in artificial intelligence (AI) represent a broad class of systems equipped with algorithms that can perform tasks typically requiring human intelligence. These systems span various domains from robotics to data analysis, playing a pivotal role in driving innovation across industries. Here, we delve into the essence of intelligent systems, their core components, applications, and the future trajectory of this transformative technology.

Understanding Intelligence

The notion of intelligence used in reference to both men and machines entails the capacity to acquire knowledge, perceive and comprehend information, deduce, rectify problems, educate oneself, and take charge of a new situation. In AI, "intelligence" is not merely the capacity to process data but more of making good or profound insights and decisions to their information.

Components of Intelligence

The components of intelligence, as understood in the context of psychology and cognitive science, are the fundamental elements that collectively define and influence the capabilities and performance of human intelligence.

Here are the primary components:

1. **Reasoning:** Reasoning involves drawing conclusions from evidence or arguments. It includes inductive reasoning, which builds general conclusions from specific examples, and deductive reasoning, which applies general principles to specific cases.
2. **Learning:** Learning is the process by which we acquire new information or modify existing knowledge, skills, and behaviors. It can occur through direct experience, observation, or instruction, and is fundamental to adapting to new situations.
3. **Perception:** Perception is the cognitive process of interpreting and organizing sensory information to understand the environment. It allows us to take in sensory data through our sense organs and make sense of the world around us.
4. **Linguistic Intelligence:** Linguistic intelligence refers to the capability to use language—both written and spoken—effectively. People with high linguistic intelligence are skilled at reading, writing, telling stories, and memorizing words.
5. **Problem Solving:** Problem solving is the ability to process information and find solutions to complex or challenging situations. It involves identifying the

problem, generating potential solutions, and implementing the best solution effectively.

What are Intelligent System?

An intelligent system in AI is a technology equipped with the capability to gather data, process it, and make decisions or perform actions based on that data. At its core, an intelligent system mimics the cognitive functions of human beings, such as learning from experience, understanding complex concepts, solving problems, and making decisions.

Reasoning in Intelligent Systems

Intellection is a dependable attribute of intelligence, which is not possible without the systems' ability to make inferences based on available data. There are several types of reasoning used in AI:

1. **Deductive Reasoning**: Exploiting a particular result after taking into account or issuing general principles or premises. One way is to look at the assertions as individual ones. For example, if all humans are mortal, and Socrates is a human, then Socrates is mortal.
2. **Inductive Reasoning**: One approach to prediction is to have an idea on the specific condition and then make the general inferences. For instance, the recurring act of sun rising every morning and forecasting the idea of the sun rising tomorrow.
3. **Abductive Reasoning**: Infare of the most probable pair for a documentation. Such as, if the ground is wet, on may understand that rains did occur lately.

Learning in Intelligent Systems

In intelligent systems, learning is pivotal for adapting to new environments and improving decision-making. Here's a brief overview of common learning paradigms:

1. **Supervised Learning**: Involves training a model on a dataset that includes both inputs and expected outputs, enabling the system to predict outcomes based on past data. Common applications include facial recognition and spam filtering.
2. **Unsupervised Learning**: Focuses on identifying patterns and structures in data without predefined labels. It's used for clustering and anomaly detection, such as in market segmentation or fraud detection.
3. **Reinforcement Learning**: Employs a system of rewards and penalties to foster environment-specific decision-making. This method is vital in robotics and complex game systems where the AI must adapt strategies based on dynamic conditions.

4. **Deep Learning:** Utilizes neural networks with multiple layers to analyze large volumes of data, enhancing capabilities in image and speech recognition technologies.
5. **Transfer Learning:** Applies knowledge acquired from one task to different but related problems, enhancing efficiency and adaptability across various applications with minimal additional training.

Perception in Intelligent Systems

Being able to perceive means that intelligent systems are able to give sense to the data received via their overwhelming number of senses and comprehend their surroundings. This includes:

1. **Computer Vision:** The capacity of being able to take in and interpret images and consequently sift and classify different objects, facial details, and scenes.
2. **Speech Recognition:** The possibility that a machine can transcribe language into text and give a machine the capability to and how he or she should respond to human speech.
3. **Sensor Integration:** Employing a sensor with multiple point of view helps to integrate different outputs, thereby leading more in-depth data. Cameras, microphones, and touch sensors contribute to the creation of a method for determining the surrounding circumstances.

Linguistic Intelligence in Intelligent Systems

Linguistic intelligence (AI) includes the capability to grasp, decipher and produce language that a human being can understand. This is primarily achieved through Natural Language Processing (NLP), which encompasses:

1. **Text Analysis:** Use of NLP in doing main text analysis such as sentiment analysis and topic modeling.
2. **Machine Translation:** Tend to propose a solution that is done by a machine system when it tries to translate text from one language to another like Google Translate.
3. **Dialogue Systems:** Bringing up language conversational agents or chatbots that can have interaction with humans using natural language, such as virtual assistants like Siri and Alexa.

Problem Solving in Intelligent Systems

Intelligent systems perform problem-solving for the sake of it. The first cognitive function is the recognition of a problem, devising a plan, and executing it in order to find a solution. Techniques used include:

1. **Search Algorithms:** Explore techniques for example, depth-first search, breadth-first search, and A* algorithms, which are used to criss-cross the possible solutions, in order to find the optimal solution.
2. **Heuristics:** Generally, these heuristics give methodology of the process some boundary which is key to such problems.
3. **Optimization Techniques:** Methods functioning as genetic algorithms and simulated annealing to optimize the search through most of the available possibilities.

Core Components of Intelligent Systems

Intelligent systems integrate various components of AI technology, including machine learning algorithms, natural language processing, robotics, and expert systems, among others:

1. Machine Learning (ML)

Machine learning algorithms allow systems to learn from data patterns and improve their decision-making over time without being explicitly programmed. ML models are used in applications ranging from predictive analytics in business to diagnostic systems in healthcare.

2. Natural Language Processing (NLP)

NLP enables a system to understand, interpret, and generate human language in a way that is both meaningful and useful. This component is crucial in applications like chatbots, voice-operated GPS systems, and customer service AI agents.

3. Robotics

Robotics combines AI techniques with mechanical engineering to create robots capable of performing tasks that require human-like dexterity and decision-making. These are often employed in manufacturing, where they work alongside human operators to enhance productivity and safety.

4. Expert Systems

Expert systems use rule-based algorithms to emulate the decision-making ability of a human expert. In fields like law and medicine, they provide critical insights based on a set of rules derived from the knowledge of experts.

Human Intelligence vs Machine Intelligence

Here's a key differences between human and machine intelligence:

Aspect	Human Intelligence	Machine Intelligence
Creativity	Swings between new concepts and solutions and expresses by using experiences and emotions.	Artificial intelligence is taking on more tasks using patterns and data, leaving a lack of authentic creativity behind.
Emotional Understanding	Ensures, assesses, and has strategies to handle emotions.	This algorithm may recognize facial expressions but it does not relate emotions or feel the way humans do.
Adaptability	Always be able to adapt quickly in the face of unforeseen challenges to be a clear competence.	Covering small body of water, not providing supplies for complete category scenarios.
Common Sense	Instinctive know-how in our daily lives is very helpful.	He finds it hard to consider the whole picture and has problems with the context, due to which he is not able to come with an intelligent decision.
Learning and Experience	From personal experiences and social interactions, participates and from then on can adapt accordingly.	Extracts knowledge from large datasets and does not need the personal experiences of a human being.
Ethical and Moral Reasoning	It not only provides ethical values and morals, but there is also a character plausibility to it.	Keeps to ethical rules as only stand principle, without an internal idea about the morals.

Applications of Intelligent Systems

Intelligent systems are transforming numerous industries by enhancing efficiency, accuracy, and productivity:

- **Healthcare:** From diagnostics to robotic surgeries, AI systems are providing solutions that help in early diagnosis and personalized treatment plans.
- **Automotive:** Intelligent systems power autonomous vehicles that can perceive their environment and make driving decisions, significantly enhancing road safety.

- **Finance:** In finance, these systems are used for algorithmic trading, risk assessment, and customer service automation.
- **Retail:** AI enhances customer experience through personalized shopping recommendations and inventory management using predictive analytics.

Future Trajectory

The future of intelligent systems in AI looks promising, with advancements leaning towards more autonomous, integrated, and ethical AI solutions. Research is focused on making AI systems more explainable and fair, reducing biases inherent in training data, and ensuring that AI-generated decisions can be understood and trusted by humans.

Moreover, the integration of AI with other emerging technologies like the Internet of Things (IoT) and blockchain is expected to further enhance the capabilities of intelligent systems. This integration promises more secure, interconnected, and efficient systems that could revolutionize industries like supply chain management and smart city development.

What are intelligent systems?

Intelligent systems are technologically advanced machines that perceive and respond to the world around them. Intelligent systems can take many forms, from automated vacuums such as the Roomba to facial recognition programs to Amazon's personalized shopping suggestions.

Our department focuses on two main areas within intelligent systems: how machines perceive their environment and how those machines interact with that environment.

One way that such systems can perceive their environment is through vision. The study of how computers can understand and interpret visual information from static images and video sequences emerged in the late 1950s and early 1960s. It has since grown into a powerful technology that is central to the country's industrial, commercial, and government sectors. The key factors that have contributed to this growth are the exponential growth of processor speed and memory capacity as well as algorithmic advances.

The field of intelligent systems also focuses on how these systems interact with human users in changing and dynamic physical and social environments. Early robots possessed little autonomy in making decisions: they assumed a predictable world and performed the same action(s) repeatedly under the same conditions. Today, a robot is considered to be an autonomous system that can sense the environment and can act in a physical world in order to achieve some goals.

Applications of intelligent systems

Intelligent systems are poised to fill a growing number of roles in today's society, including:

- Factory automation
- Field and service robotics
- Assistive robotics
- Military applications
- Medical care
- Education
- Entertainment
- Visual inspection
- Character recognition
- Human identification using various biometric modalities (e.g. face, fingerprint, iris, hand)
- Visual surveillance
- Intelligent transportation

Challenges in intelligent systems

Research in intelligent systems faces numerous challenges, many of which relate to representing a dynamic physical world computationally.

1. **Uncertainty:** Physical sensors/actuators provide limited, noisy and inaccurate information/action. Therefore, any actions the system takes may be incorrect both due to noise in the sensors and due to the limitations in executing those actions.
2. **Dynamic world:** The physical world changes continuously, requiring that decisions be made at fast time scales to accommodate for the changes in the environment.
3. **Time-consuming computation:** Searching for the optimal path to a goal requires extensive search through a very large state space, which is computationally expensive. The drawback of spending too much time on computation is that the world may change in the meantime, thus rendering the computed plan obsolete.
4. **Mapping:** A lot of information is lost in the transformation from the 3D world to the 2D world. Computer vision must deal with challenges including changes in

perspective, lighting and scale; background clutter or motion; and grouping items with intra/inter-class variation.

Studying intelligent systems

Students who want to study intelligent systems will need to be able to understand and integrate knowledge from various subject areas including:

- Programming
- Data structures
- Algorithms
- Pattern recognition
- Machine learning
- Artificial intelligence
- Physics
- Numerical methods
- Psychology

Intelligent systems **solve complex problems automatically and more efficiently** within specific environments. They are formed by the collaboration of people and technologies such as Big Data, the IoT ("Internet of things"), mobile networks (3G, 4G, 5G) AI or artificial intelligence, robotics, video analytics, computer vision, and augmented reality, among others.

In this article, we will discuss what intelligent systems are, their origins, operation, components, and applications most used today, in addition to mentioning how Autonomous Artificial Intelligence can elevate their operations.

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What are intelligent systems?

Intelligent systems are a technology that has emerged and become more important in the last decade.

Intelligent systems are the answer to the accelerated technological growth of recent years and the needs of people and organizations in an increasingly interconnected world.

In this context, intelligent systems involve various physical, digital and human parts to achieve a common goal. The rearrangement, interaction and learning between all these components is part of the transformation of Industry 4.0.

Industry 4.0 seeks to modify current companies' working models so they can adapt and grow in this new collaborative environment between machines and humans. At Algotive, we call it the machine-colleague experience.

The interconnectivity and relationship between each of the components of intelligent systems is what makes it "intelligent".

A strict definition of an intelligent system is given by [Martin Molina in his paper, "What is an intelligent system?"](#) published by the Technical University of Madrid:

“An intelligent system operates in an environment with other agents, **possesses cognitive capabilities such as perception, action control, deliberative reasoning or language**, follows principles of behaviour based on rationality and social norms, and has the ability to adapt by learning.”

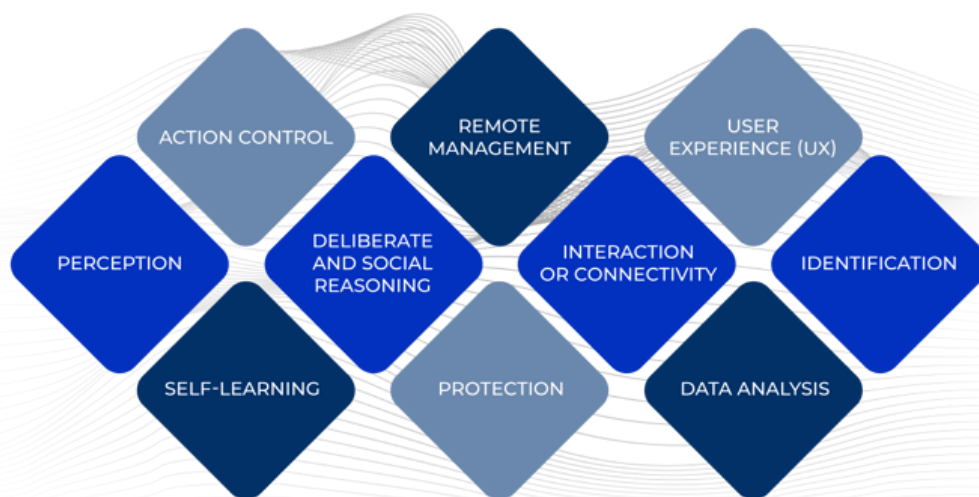
How do intelligent systems work?

Generally, intelligent systems use IP (Internet Protocol) technology and sensors to collect information from a specific environment and share it among its different elements to achieve a common goal.

This interconnection between the digital and physical worlds is called the Internet of Things. On the other hand, Big Data is another element that makes this type of system possible to collect information and knowledge within a system. And this same technology learns from its experiences with artificial intelligence technologies and its main subfield, machine learning.

[Learn more about Data Science and how it works with AI in our full article here.](#)

10 CHARACTERISTICS OF INTELLIGENT SYSTEMS



The main characteristics of an intelligent system are:

Perception: An intelligent system creates a representation of the world to interact with a specific environment and perform tasks.

Action Control: An intelligent system can carry out actions or interrupt actions to achieve a goal.

Interaction or connectivity: An intelligent system can put its elements into communication through a common language.

Deliberate and social reasoning: The machine makes decisions on its own to achieve a specific result, considering the human context.

Self-Learning: Intelligent systems can reduce errors and optimize their performance by learning from their own experiences.

Identification: Intelligent systems can recognize specific information automatically and transmit it through various channels.

Protection: An intelligent system's networks and communications must be secure to function properly.

Remote Management: An intelligent system allows people to interact with it from any location.

User Experience (UX): To interact with users, intelligent systems must have accessible and adjustable interfaces.

Data Analytics: An essential component of an intelligent system is its ability to process immense amounts of data.

Properties of intelligent systems

Intelligent systems have fundamental similarities, but depending on the industry, they can vary greatly.

Here are 6 elementary properties of intelligent systems:

1. Sensors

The technology collects data from the environment and transmits it to the intelligent core for identification and analysis.

2. Actuators

They perform the actions that the intelligence core determines once it analyzes the environment in real-time.

3. Specific environment

It is the context that the intelligent system analyzes and modifies. They can be static, discrete, episodic, deterministic, or known.

4. Intelligence Core

Artificial intelligence and machine learning are the pillars of this section. It is what makes it possible to generate situational awareness and learn from the situation. l User interface (UI).

5. User Interface (UI)

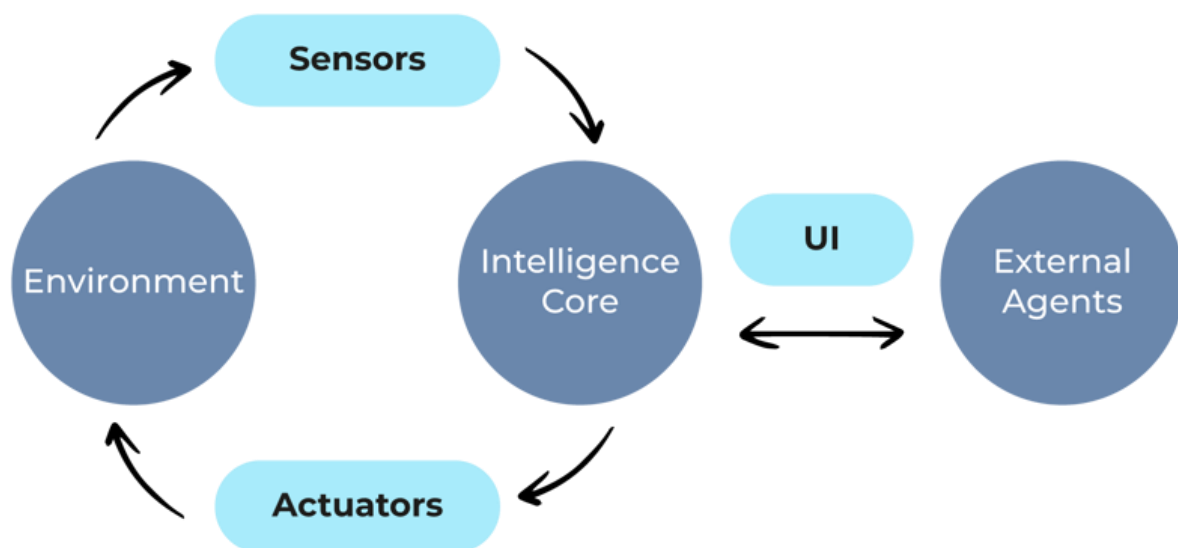
It is the way an external agent communicates and alters the relationship between the system and the environment.

6. External Agents

The people who oversee the process of the intelligent system or even other artificial intelligence.

INTELLIGENT SYSTEMS FUNCTIONALITY

INTELLIGENT SYSTEMS FUNCTIONALITY



History of Industry 4.0

Industry 4.0 or also known as IoT is a new **phase within the industrial revolution focused on interconnectivity, automation, big data, machine learning, and real-time data** being of special help to companies in manufacturing and supply chain management.

Technology has created the industrial revolution since the 19th century, where each phase has been recognized by technologies such as mechanization, electricity, computing and digitization, over time it has created an impressive change for

companies and workers.

The first industrial revolution

The first industrial revolution occurred between the late 18th and early 19th centuries. This movement ushered in a period of growth and profound transformation in the systems of work and structure of society.

Manufacturing evolved to optimize manual labor performed by people and supported by animals. It mainly consisted of replacing the old handmade tools with more productive machines powered by steam or water along with other machines.

The second industrial revolution

At the beginning of the 20th century, we entered the second industrial revolution where industrial and social changes were generated and the economic model improved thanks to the introduction of steel, chemical products, the use of electricity in factories and the obtaining of new forms of energy.

The introduction of electricity allowed manufacturing companies to increase their efficiency, dynamism and productivity, giving local markets the opportunity to expand and internationalize.

The third industrial revolution

The third industrial revolution took place in the middle of the 20th century, when manufacturing companies began to incorporate more technologies until the implementation of computers in factories.

This stage is characterized by the use of renewable energies, smart electric power, conversion of buildings into power plants and more internet communication technologies and renewable energies.

During this period, manufacturing companies began to experience a shift with less analog and mechanical technologies and more on digital technology and automation software.

The fourth industrial revolution, or Industry 4.0

In recent decades, a fourth industrial revolution, known as Industry 4.0, has emerged. This new stage is committed to greater automation, connectivity and globalization.

It emphasizes the digital technology of recent decades and takes it to a whole new level with the help of interconnectivity through the Internet of Things (IoT), access to real-time data, and the introduction of cyber-physical systems.

It has allowed to connect the physical with the digital enabling better collaboration and access for all departments, partners, suppliers, products, and organizations.



What is the Internet of Things (IoT)?

The Internet of Things (IoT) is the process of connecting everyday physical items to the Internet equipped with sensors, software, and other technologies to receive data from other objects. In general, this smart technology helps things work better, more productively, and synchronized.

The IoT consists of smart devices connected and adapted for the web using integrated systems such as hardware, processors, and communication sensors that allow them to intervene in the collection and transfer of information and take actions depending on the environment they are directed to.

The IoT ecosystem only requires human intervention and a computer to set up its configuration and give it specific instructions to carry out. An important factor of this tool is that it interacts with artificial intelligence using machine learning to help it make information-gathering processes easier and more dynamic.

The goal of IoT is to **analyze data and automate subsequent decisions or actions.**

This is the IoT process in 4 steps:

1. Capturing data

This process is through sensors where IoT devices capture data and information from their environments such as temperature or a real-time video.

2. Sharing the data

Using available network connections the devices will give you access to the data through a private or public cloud.

3. Processing the data

This process consists of programming the software to perform actions or make decisions based on the data.

4. Acting on the data

The accumulated data from all devices in an IoT network is analyzed. This provides strategic information to inform reliable business decisions and actions.

IoT brings numerous benefits in both home and commercial environments. This tool can improve usability and efficiency within a company to save time and money, it facilitates access to information regardless of location, time, or device, it has dynamic and efficient data transfer, as well as the ability to increase security in alarms, locks, and cameras to reinforce protection in a home or work.

This technology has shown us that it has hundreds of tools that will improve the lifestyle of people and organizations having more and more present in our daily lives.

If you want to learn more about how this technology works and its impact, [read our full article on the Internet of Things \(IoT\) here.](#)

What is cloud computing?

Cloud computing or also known as "**cloud technology**" focuses on offering computer services remotely by hosting information in external data centers. It is a technology that allows the use of different services such as file storage, application use, or device connection, without taking up space on a computer's hard drive.

Cloud computing allows remote access to software, file storage, and data processing through the Internet and devices such as computers, smartphones, and portable accessories connected wirelessly.

3 most important features of cloud computing:

Offsite storage:

This is the most well-known application of cloud computing. It allows any person or company to store files in an internet space without taking up hard disk space. There are hundreds of external storage systems ranging from personal storage, to backups for email, photos, videos, and other personal files, but we also find for business storage so that data files and more can be transferred and stored.

Use of online applications:

This tool provides a great value to companies being very useful for any type of

application such as design, IT, accounting, and more thanks to saving installation space on the computers of the collaborators, allowing everyone to use the same application and there is an integration of work within the organization.

Connecting from anywhere and at any time:

Cloud computing is a technology that can be accessed from any place and device with the right access you can view all the information stored in the cloud and use all the online applications installed.

In addition to these three features that give added value to the company to streamline the work of employees, there are hundreds of key benefits that companies would get by adopting the cloud infrastructure.

A clear example of the benefits of cloud computing is data security. One of the main concerns for organizations is the breach of private data as this could severely damage the company's revenue, customer loyalty, and brand positioning. Nowadays, hundreds of companies that offer cloud computing services guarantee security, good storage, and data management.

It is also important the efficiency and savings we get by using the cloud because we would not have the need to spend large amounts of money to buy and maintain equipment.

And control is essential, especially for sensitive data that the company may have. Cloud computing gives us visibility and absolute control over the data, as well as visualizing the documents visible to each collaborator.

This tool not only helps companies, but also hundreds of individuals to safeguard important information without the need to use space on their computers or devices.

Cloud computing is a vast industry with many opportunities in the future. **If you want to learn more about this fascinating technology, read our article on cloud computing here.**

Applications of intelligent systems

As mentioned before, intelligent systems have the ability to decide for themselves what actions to perform by means of perceptions, knowledge, and experiences, which are previously established by people.

But it is essential to know how intelligent systems provide benefits to organizations from

their operation in tangible solutions.

These are 5 applications of intelligent systems used by companies to enhance their operations, products, and/or services:

Autonomous Robots

This is one of the most complex intelligent systems but at the same time, one of the fastest-growing and most far-reaching in recent years. They were originally conceived for critical industrial operations. However, over the years we have seen their incorporation into the home and automotive markets.

It is a technology that holds great promise and opens up new areas of collaboration for high-risk situations.

Computer Vision

Computer vision gives computers the ability to understand the visual information they receive. For this application to acquire information from an image or video, algorithms based on neural networks must be implemented.

In addition to understanding images and videos, this tool can also classify, detect and track objects.

- **Object classification:** the system receives an image and tries to understand the object it has, it is not relevant to the location of the objects but simply classifies an object by image.
- **Object detection:** the system tries to locate objects and classify them. It is used especially in autonomous cars to detect traffic signs and then classify them to know the type of sign being observed.
- **Object tracking:** it is used to know where each object is, and what type it is, and perform a search to objects such as vehicles and even people to detect the busiest routes.

[Learn more about how these types of systems work in video surveillance in our article here.](#)

Natural Language Processing (NLP)

This field is dedicated to researching the way machines communicate with people through the use of human languages, such as Spanish and English. Any language can be processed by computers being a more advanced tool in text analysis because it is easier to analyze this information in electronic format.

Google is a company that uses this type of technology for its search engines or language translation applications.

Expert Systems

This tool uses accumulated knowledge and previous experience to make deductions and simulate solving strategies. These systems are developed to master knowledge and to simulate the functioning of the human brain through neural networks.

They gather information to tackle the most challenging problems. It is necessary to interpret the data to arrive at the right solution depending on the business objectives such as analysis, treatment and diagnostics for patients and doctors.

Sentimental Analysis

It is a field within artificial intelligence and applied linguistics that studies interactions between machines and humans.

This tool is currently being implemented in various social networks to recognize the concepts and intentions of the person writing the message. It uses advanced artificial intelligence technologies, natural language processing, text analysis, and data science to identify, extract and study subjective information.

Thanks to this technology, companies have learned how customers react to a specific product or service by classifying texts as positive, negative, or neutral.

These intelligent systems allow companies to optimize various processes and are key to generating products that respond to the needs of society in order to improve the quality of products and services.

5 APPLICATIONS OF INTELLIGENT SYSTEMS



4 Companies using intelligent systems

Nowadays, the development of this technology has expanded our field of vision of science turning things we thought impossible into a reality, these technologies are in daily contact with us and surely you didn't know it.

These are the 4 most important companies that are currently implementing intelligent systems to improve their internal management to improve the experience of customers and users.



This company is one of the best in the electric motor sector. Although it is not only dedicated to sell and manufacture electric vehicles, but among its offer it has all kinds of products dedicated to make life easier for those who have one.

One of its most outstanding products is the Autopilot, which is an advanced function that offers drivers of electric cars the possibility of an assistance system that helps driving.

Thanks to the advanced hardware and technology endowment the vehicle connects to the internet and reads the GPS to set an adaptive cruise speed, set a safe distance to the car in front and even automatically park itself.



Alexa is the voice-based smart home system developed by Amazon. Amazon has created the Alexa Voice Service (AVS) to mimic real conversations but is actually using intuitive voice commands to make it perform the tasks asked of it.

It is a technology that is based on natural language processing and an intelligent voice recognition service that allows you to voice-enable it on any connected device with access to a microphone and speaker, while Alexa will have the ability to understand and respond to people in order to learn more and more human behavior and interests.

It is a tool that has revolutionized the technology inside our homes thanks to human-computer interaction will increasingly be able to learn about our interests and create deep conversations.



This globally recognized company has been characterized by increasing or decreasing its prices based on the demand and supply of accommodations with similar characteristics to the host with data such as location, season, accommodation classification, proximity of check-in and more.

The difference of Airbnb's dynamic prices with those of hotels or airlines is that this depends on the rules defined by the user becoming accurate and fast when adjusting prices instantly, it also analyzes external data from the user's environment such as news, weather, local events, weather, traffic and more.



Nowadays, the amount of social media content we consume daily is incalculable. That's why companies like Twitter and Pinterest use content curation to make better decisions and recommendations for users to present them with content they tend to like based on past experiences and interactions.

Twitter has implemented natural language processing to improve the knowledge of each user and sort the timeline according to their interests, even this tool has become an ally in the fight against harassment, fake news, extremism and more issues that may affect other users within this social network.

Examples of Intelligent Systems

There are several **Intelligent Systems** that are used every day in our lives. These range from everyday objects like smartwatches to much larger scenarios such as Intelligent Manufacturing Systems for larger projects.

Here are some examples of how these **Intelligent Systems** are used and implemented nowadays:

Network Monitoring and Analysis Systems

Network Monitoring Systems are software that provides monitoring and automating tools to make sure the bandwidth of a certain network is working properly. They

allow users to monitor computer networks and their components (which can include firewalls, routers, wi-fi or Lan connections, devices, servers, and more). These **Intelligent Systems** connect devices and software while optimizing the information that travels among them.

They also investigate and flag performance issues and organize the data recovered in a user-friendly interface. Network Monitoring and Analysis Systems have proven pivotal for organizations that rely on these networks since an error in the connection can put the whole operation at risk.

Smart Watches (Biometric Monitoring)

Perhaps the most known of the **Intelligent Systems** are the smartwatches, which have been a popular product during the last decade. These small computing devices get their names due to their resemblance to a wristwatch, although they do more than simply tell the time.

By connecting via Bluetooth to another device (usually a smartphone) or via Wi-Fi directly to a network, smartwatches can receive and make phone calls, read emails, listen to music, manage files, or even access websites. Some smartwatches also have other uses as they can monitor biometrics, such as heart rate, blood pressure, oxygenation, or the number of steps and physical activity done during a certain period. This has proven relevant to the health of many people, particularly if they suffer from conditions in which these biometrics must be checked regularly.

AI visual inspection

As it might be expected, visual inspection is necessary for many production processes to detect defects or problems in certain products or areas. Nowadays, **it is most important in factories with assembly lines dealing with thousands of products daily.** Thus, it helps to minimize human error and save time, which is why Artificial Intelligence has been implemented to the procedure.

What this entails is the employment of a **visual inspection** process based on computer vision and Deep learning. An Intelligent System conformed by several technological elements is used to monitor and inspect an operation to ensure that it works properly, and its products meet the standards required. **AI visual inspection** simulates a human visual examination on a computerized system while learning patterns and applying them to the recovered data to identify defects in the products.

Nowadays, the implementation of **AI visual inspection is pivotal in assembly lines or other automatized processes as it can inspect products partially or entirely, saving time and reducing human error.**

Product planning and delivery

Another type of **intelligent system** relevant to today's several industries is the **Intelligent Manufacturing System (IMS)**, which implies the collaboration between humans, machines, and processes to optimize product planning and delivery within a certain manufacturing process. IMS creates models of planning, factory layout, production design, and use of machinery, among other things, to create, propose, and implement the best processes for a certain product, focusing not only on quantity or quality but also on resource-preservation and sustainability. The use of **AI** within these systems implies that new products, along with their planning and delivery, can be created without human intervention. **The AI can also analyze existing processes and flag errors, helping to make them more efficient.**

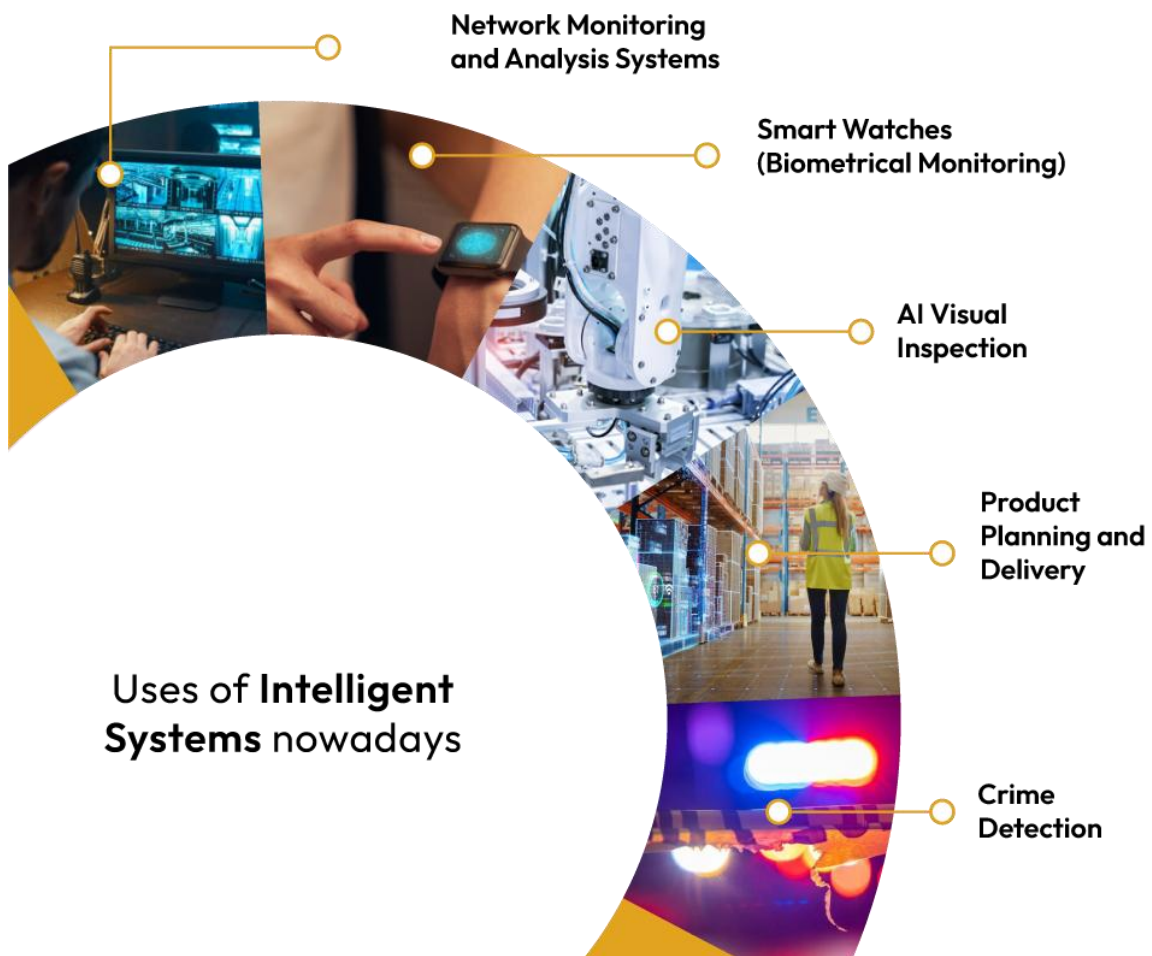
Crime detection

The use of **intelligent systems** has been used in the last years to ensure the safety of citizens all around the world. **Crime detection and prevention are made easier both in the private and public sectors by the implementation of Intelligent Surveillance Systems.** These connect humans, computers, software, cameras, internet, and other elements to create a network of surveillance that can detect in real-time possible crimes or crimes in progress within a certain range.

The implementation of **AI** for monitoring cameras eliminates factors such as human fatigue or attention span and greatly improves the chances of catching a criminal. **AI can learn** to recognize certain patterns and social behaviors, as well as implement face-recognition features, which means it can be trained to detect and flag illicit activities, quickly transmitting this information to a particular channel such as police departments or monitoring stations. These **intelligent systems** will prove pivotal for reducing crimes in our cities.

For example, the vehicleDRX can identify a vehicle with only about 5% of an image of a camera, providing resources to all surveillance officers and increasing productivity at crime centers up to 48.7x.

This has helped to reduce, for example, motorcycle crimes, which present one of the most common crimes in several cities.



Intelligent systems and autonomous AI

Even though artificial intelligence is one of the components of intelligent systems, autonomous AI takes its capabilities to the next level.

[Read our following article to learn more about the power of IoT and Artificial Intelligence combined.](#)