

# **Security systems using artificial intelligence, the Internet, and their role in digital signal processing within the diversified road environment: land, sea, and air**

**By**

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## **Abstract**

The relationship between digital signal, artificial intelligence, and the Internet of Things. Our world today is an extensive network of signals that we constantly trade and deal with. They are of several types, including mobile phone signals, televisions of all kinds, radios, and others, all emanating from power lines. There are signals like some medical devices such as a heart signals graph or pendulum that gives a complete tinge and other equipment or devices issued for signals and all kinds. To take advantage of this signal and complete its work, we must process it and prepare it in proportion to the work on which it was based. Here we get out that signal processing is the science of signal processing. It prepares us for different ways to make the signal suitable to deal with it by using artificial intelligence to convert Internet of things data into useful information to enhance decision-making processes and improve interactions between man and machine. when computers appear in When computers appeared in the early 1970s, there was a big revolution in the field of microprocessors, and of course, this situation painted a new picture of the future of other sciences and especially the science of signal processing, and this scientific revolution made the signal processor an important tool entered in various fields such as communications and electronic specialties and electrical, mechanical and geological specialties and many others, so the adoption and study of signal processing within a wide range such as artificial intelligence in the environment of the Internet things because of their flexibility and use in all fields such as Military fields

**Keywords:** Digital signal, Artificial intelligence, Internet stuff, The Industrial Revolution, Science of treatment.

## **Introduction**

Everyone knows the importance of digital signals in our daily lives now, and I meant the word “everyone” because of our use of devices. Smart daily and instantaneous and now within our societies we find the elderly and young even if they are not educated, they take the term weak network or good network or the word weakness on the Internet and often mention the word strong signal or the signal is weak and other various words that touch on the digital signal knowing that the uses of the digital signal is included in more than 30 applications in reality And I’m going to talk to some of them for a statement. Its importance and how. It will also explain how and important it is to use artificial intelligence devices and equipment for digital signaling in life. Public which has become an urgent daily matter for the average

individual and it is not hidden to everyone that everything that is used within a residence or workplace where artificial intelligence equipment or equipment are present. As you'll find in it from the apps for digital signal a lot, and it's going to be explained in our papers, as we've been making it clear the importance of these technologies in our lives daily.

### *The signal*

It is defined as any material quantity that varies depending on the time, location or any other independent variable.

### *Digital Signal Processor (Nieto et al., 1998)*

It is a digital processing of signals on a digital computer or some other data processing device. . Or In other words: a specialized small processor designed by Sa to process digital signals, in general in Real time. Or it is a process of analyzing and modifying a signal to improve or improve its efficiency or performance. It involves apply various mathematical and computational algorithms to analogue and digital signals. This shows that DSP is used primarily to detect errors, filter and compress analog signals in transit. It is a type of signal processing that is carried out through a digital signal processor or a similarly capable device .

DSP can implement specific processing algorithms. Usually DSP, first converts an analog signal into a digital signal It then applies signal processing techniques and algorithms. For example, when I performed the signals Acoustic DSP, helps reduce noise and distortion. Some DSP applications include signal audio processing Digital image processing, recognition Speech recognition, biomedical medicine, and more. (Proakis & Manolakis, 2013) ( **John G. Proakis** ) stated that signal processing is one of the sciences of electrical engineering and applied mathematics.

You're interested in analyzing and modifying signals such as sound, image, communication device signals, and signals. Biological such as: Signaling the future of a Wi-Fi device as an example of wireless communication systems. An electric signal to the heart From which important information about the heart may be extracted.

( **Alan L. Sheldrake** ) is an electrical engineering and applied mathematics. It specializes in analyzing and adjusting Image bookmarks, sound signals, communication devices and geological signals, And treatment. the signal is any change of signal characteristics. ("Imperial College of Science and Technology, University of London," 1969) Signal processing classes consist of analog signals, continuous time signals and separate time signal And the digital signal and non-linear signals and for example I will mention the following signals.

1. Speech (digital response devices, audio synthesis and music recognition (CD technology and digital radio)
2. Vital medical signals (EEG, ECG)
3. Image (standard, JPEG digital camera)
4. Video (Standard, MPEG Digital TV)
5. radar signals to determine the range and direction of long-range targets.

### *Digital signal processing (Stanley et al., 1988)*

The digital signal is processed through sensor processors to collect signals, filter noise or remove

Interference, information extraction or processing of information are classified as :

### ***1. Analog Signal Processing (ASP) (Stanley et al., 1988)***

Continuous time signals with continuous breadth are processed. The analog signal may be contaminated with signals external noise. electrical noise causes changes in the breadth of the message signal and this noise disturbs the content of the information. Uses a generally low pass filter to reduce noise and thus get clear signal. In the drawing below, the continuous function of the V of the continuous variable t (time, space, etc.) is shown:

| <b>Digital filters</b>  | <b>Analog filters</b>  |
|---|--|
| Governed by the equation of linear differences, consisting of additions, complications and delays suppressed in digital logic (weather in devices, programs or both) candidates transactions are designed to meet the desired frequency response. | Controlled by a linear differential equation consisting of electrical such as resistors, capacitors and analog conversations, the rounding problem is solved to meet the required frequency. |

### ***Processing separate signals (Caloz et al., 2013)***

Separate in time, continuous capacity.. Signal information. The signal is called separate if it can only

To receive a specific number of values and we can say that they indicate a specific number of values. Usually, it contains signals sent through separate channels on two or three values. Provides the use of triple signals the value syncs the transmission.

### ***2. Digital Signal Processing (DSP) (Stanley et al., 1988)***

#### ***Digital signal processing***

Is digital signal processing on a digital computer or processing other data.

#### ***Digital signal processor machine***

It is a small device designed to process digital signals in general in real time. The  $V_k$  separate function of the separate sampling variable  $T_k$  with  $k$ = correct number as shown in the drawing =  $V_k V(T_k)$ ..

#### ***Digital versus analog process: (Cole & Company, 2016)***

Digital Signal Processing (DSPing) branched out into :

- enjoys more flexible advantages.
- Easier to upgrade and update the system often.
- Easy data storage.
- Better control over accuracy and implementation of requirements.
- Features re-production.

#### ***Digital filters : (Thurston et al., 2020)***

So far, our DSP treatment has focused primarily on analyzing separate time systems. Now we have Analysis tools to start designing separate time systems this means that the digital filter design system ( is a design non-linear systems or systems that change over time are generally more hindering, and often more specific to the situation ) This is to enhance or reduce certain aspects of that particular signal as necessary. Heavily used in signal processing is different from the analog filter, an electronic signal circuit digital filters are continuous and expensive compared to analog filters but can turn many from practical or impossible designs

to possibilities in everyday life can be found in devices such as mobile phones, radios, audio/video receivers, etc. and Miley candidates are :

### ***Filter***

The filter is defined as a network that allows frequency range without reducing its size until the cutting frequency Required and rejected all other frequencies.

### ***Digital***

It is defined as a digital procedure or algorithm that converts or modifies the selected input sequence into another shape suitable, which contains some desirable properties such as noise reduction, distortion, etc

### ***Table comparison between digital and analog filters (Rusu et al., 2015)***

### ***Artificial intelligence to process digital signal in the internet environment stuff : (Zhang & Tao, 2021)***

Artificial Intelligence (AI) is the behavior and specific characteristics of software that make it simulate Human mental abilities and working patterns. There are many definitions of artificial intelligence but there are four definitions that are considered philosophical according to the work of artificial intelligence and are the most famous and widespread among society scientific and universities in the world on the basis of which research and scientific groups work to develop new programs to help them In working life, it's adopted as systems where it's found to think like human beings, act like humans, and think in a way rational and behave in a rational way. Researchers believe that the use of artificial intelligence these days is used in many military fields Industrial, economic, technical and medical applications are the most widespread in the world and have become in some areas are a reality through which great achievements such as identifying shapes such as faces or identifying handwriting and many other areas. Intelligence is also used in diagnosis and non-linear control like controlling the railroad. Robots are also used in nuclear reactors, extending wires and repairing extensions. Underground wired and mine detection robots are also used in industries such as automotive industry

Processors and other micro-fields have also been used as AI programs in data analysis economic as stock exchange is also used in computer games where gaming theory has been developed by taking advantage

Artificial intelligence has contributed a lot to this field. There are many applications other artificial intelligence using algorithms to do its job.

### ***Internet of Things (IoT) : (Nimodiya & Ajankar, 2022)***

Is a concept that includes everyday objects from industrial machines to wearable devices where using Integrated data collection politicians are taking action on data over the Internet and we are aware of this the sassat is used automatically to adjust heating and lighting, or alert an employee who is maintenance by with a production data in emergencies i.e. simply the Internet of Things is the future of technology that can make our lives more high has only been a few year, When we saw the real potential of the Internet of Things, it became the concept of wireless internet internet is more ingratened and terribly integrated and people are starting to understanding technology that can be a personal as well as professional way the term (Internet of Things) has been coined in late 1990 by businessman Kevin Ashton Ashton and was a member of the team that connecting things over the Internet

and said that he used the term Internet of Things for the first time in the show that introduced in 1999 and this term has remained accompanying him ever since. And there are a number of simple examples showing effects on many industries: (Al-Sarawi et al., 2017)

1. Smart transportation solutions to speed up traffic flow leading to fuel consumption and prioritization on time to repair vehicles and save lives.
2. Smart electricity networks are the most efficient in connecting renewable resources, improving the credibility of the system and obliging customers with less consumption.
3. Diagnostic and predictive monitoring devices and waiting for maintenance problems and inventory access to in the near term as well as scheduling maintenance staff in order to repair the equipment and meet regional needs.
4. Building data-based networks in smart city infrastructure, making it easier for municipal councils to manage data management, law enforcement and other programs with great efficiency.
5. Your home security system, which already allows you to remotely control locks and heat system at home as well as the house can be cooled and open the windows as you like.

And here the researcher sees a return to the link of all these technologies and smart devices associated with each other bite back for digital signal where it moves from one processor to another or from one device to another produced through a digital signal implemented by An algorithm in an electronic chip processed by executing a user's order was the absolute port of reference in an environment Internet stuff and we'll show some details of the digital signal.

***DSP applications (Digital Signal Processing) (Wang, 2008)***

**Image processing** : Identify patterns, robotic vision, improve image, fax and weather map Space animation.

**Hardware/Control** : Spectrum and position analysis, noise reduction and data pressure control.

**Speech/voice** : Speech recognition/synthesis, text to speech, digital sound and equation.

**In the army** : uses secure communication, radar processing, sonar processing and missile guidance.

**Communications** : Echo cancellation and adjustment equation ADPCM adapters and spectrum spread and conferences were used video and data communications.

**Biomedicine** : In patient monitoring, scanners, EEG brain planners and ECG analysis storage/X-ray enhancement. The researcher believes that there are some techniques that are an answer to what we mentioned in our paper if it shows the use and benefit from the reference and how to benefit from it after its treatments and mention them



***Autonomous vehicles : (Huang et al., 2016)***

Adopted self-driving car technology that works with mapping algorithms and data that gets It has multiple sensors integrated into it to determine the route of the road using the Lidar system. And it's like radar, stereoscopic vision system, gps and optical recognition system things and the real-time positioning system approved by Google as the most prominent companies in this domain.

***Motion sensor games: (Bratitsis & Kandroudi, 2014)***

There are devices that have a front camera to sense the movement that represents the future of computers that can distinguish the body the user and his movement within easy settings have the ability to track the movement of the entire body where the sensor can Easily followed like sports and dancing, although his technique will still live in other forms, such as glasses. hololens augmented reality that uses the main Kinect sensor although its technology will remain alive in forms others such as Hololens augmented reality glasses that use the main Kinkt sensor.

***Wearable Technology : (Kolodzey et al., 2017)***

It is an electronic device that a person can wear as accessories, which are in clothes or planted In the body or even tattooed on the skin and these devices contain a g-stick s and an internet connection is mostly connect video cameras or sensors to a wearable device to allow us to monitor a particular movement from objects or monitoring different activities in the region or even tracking brain, heart and muscle activity ,there are many examples, including fitness trackers and smartwatches and the Holter heart system monitor used to monitor the heart of patients and smart clothes that can measure the external temperature and then adjust its temperature fits that temperature, and there's a smart tattoo with electronic sensors that monitor heart, brain, muscle functions and other smart jewelry such as rings and bracelets watches communicate electronically with mobile phones and AI smart hearing aids that filter noise and get better performance in the user environment and there are a lot of applications adopted Google is pushing technology forward.

***Radar/Sonar : (Thurston et al., 2020)***

**a. Radar :** Is an electromagnetic radiation device used for tracking, positioning and identifying a diverse from a far distance the principle of its work depends on b w electromagnetic energy towards a specific p-limit and control the echoes are from them and the radars are characterized by optical sensors and infrared devices In its ability to detect distant objects accurately even if there is a difficult atmosphere and there are several type of radar that vary according to their use, including marine radars and radars air and radar systems in missile guidance systems, radars in biological research and devices weather radar.

**b. Sonar :** It is the device responsible for determining the depth of the seabed and exploring underwater for the purpose of navigation it is worth mentioning that the work of the sonar device on three main purities is:

- **Upstream** Generates a power pulse pack for reflection (as in active sonar) or for reception (as in passive sonar).
- **Broker** He needs to be kicked through it and it could be him or what he is or even a gym.
- **Receiver** It's the part that's responsible for turning sound waves into electric power, i.e. digital electrical impulses in order to read it and draw details of its results. Sonar is also used in medical imaging and is called ultrasound as the waves can doctors from disease detection and fetal monitoring during pregnancy and sonar is classified for several p

ano according to the principle his work and the purpose for which it is used : (Yuan et al., 2006)

- **Active** It sends a t-t pulse and then receives the sonar adapter in turn the echo of the echo of the echo. The echoes heard in active sonar systems are characteristic of C.D., and technicians are often able to Specialists in this field of knowing the difference between the echo produced by a submarine or a rocky outcrop or colony of fish or whale.
- **Passive sonar** It doesn't send a sound wave where it can detect something in its reception area. Way of listening to sound waves coming towards him from that area which is the method used To detect submarines by listening to the sound waves of engines.
- **Multi-beam sonar** This type uses several 100 sound sensors (> to map the depth of water as the systems are associated with modern multi-beam GPS sonar to create accurate sea topography maps and topographic maps of the seabed. the topography of the sea works is topographical maps of the seabed.
- **Single-beam sonar** This type identifies and detects the presence of objects within a straight line below the ship the monitor is directly monitored. The researcher believes that there are a lot of processors and applications that cannot be limited to this paper but possible drawer some applications and briefly such as brain computer interface, speech installation, supersonic machines and tests better and safer medical, 3D TV, video stream and digital photography.

## Conclusion

Before concluding the speech, I would like to mention that using these techniques properly and accurately avoids risks for individuals contained by the movement of daily life and its requirements and this leads us to the importance of digital signal in our daily lives and used in artificial intelligence within the environment of intertit things that took a lot of space in the completion of our work which we perform daily without paying attention to the importance of digital signal and this clarification was very simplified despite the greatness and greatness and the importance of the topic. The use of cars with modern proficiency, for example, or any of the modes of transport Navy or air that uses digital signal technology with how to counter digital signal and the importance of following scientific steps in the use of this technology for the purpose of controlling the data entering and out of it and the possibility of managing remote business and the use of modern technologies facilitates the implementation of business, making our lives safer and simpler and easy and I conclude my paper here and after all that, I can't pretend I've given the subject his full right if you have succeeded, it is from the grace of God and his grace. Nor do I claim perfection in this humble effort perfection alone and if you work hard here and there And I thank God that I was injured and I pray for mercy and forgiveness if I make a mistake I would be grateful to all those who are honored to alert or remedy the shortcomings (if any), so I may agree to remedy it

Here I complete my report with a number of findings and recommendations that I have put in your hands :

## Results

1. Learn about artificial intelligence and how to use data processing tools by using modern technologies.

2. Speed and ease of obtaining results during the transfer and exchange of information and data in the Internet environment things.
3. Using a digital signal processor with artificial intelligence in the internet environment, things cost very little compared to with the rest of the old systems where the first step in building the scheduling of any system is to calculate the cost in building system.
4. Data in cloud computing is available at any moment when you want to build any project of any size.
5. A great variety of technologies in the choice of desired technologies in front of the user.

## **Recommendations**

Based on the above, the study recommends:

1. The fact that the processor for digital signaling of artificial intelligence devices depends on programming in its work, so it should be used modern languages in programming when developing or in accomplishing specific tasks as required.
2. Use these technologies in all kinds of transportation, devices, smartphones and industrial devices and technology and others, to provide full knowledge of the usefulness of the Internet of things in our daily lives.
3. We recommend using artificial intelligence devices to process the signal in the completion of the tasks of the systems operating in government, educational, military, medical, highways and other systems of interest to the individual.

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