



A State of Art Survey for Intelligent Energy Monitoring Systems

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Authors' contributions

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ABSTRACT

In this study, the significance and necessities of surveillance systems have been investigated in several areas - both in the use of neural networks, street lighting systems, factories, and laboratories - for the monitoring systems, especially concerning the design of artificial intelligence programs. The importance of these initiatives and how they can affect any sector and industry reach an essential point from here. Here we reach an important point. An algorithm and an extraordinary approach have been used in every field to develop an intelligent programmer. Something has been mentioned here: the ability to access these intelligent programs in all areas of life. We concentrate on a variety of fields of use and design of monitoring systems in this review article.

Keywords: Energy systems; artificial intelligent; internet of things; neural networks; smart city; monitoring systems.

1. INTRODUCTION

The complexity of grid managers has been shown by applying efficiency and reliability to control electricity generation flows, leading to decentralized energy. The energy transition promotes the growth of sources of energy [1]. Due to the need to cope with an oil shortage, energy storage and global heating are now highly significant[2]. However, the management has several problems that can arise from nonlinearities like the actions of power converters or the enforcement of limitation of the various device components or the difficulty in choosing one that will provide energy to a set of charges, among a set of energy-generating sources [3,4]. Most of the existing electronic devices with processors or microcontrollers can be linked to the outside world. They are connected via the Internet [5], on the other hand. They have good trustworthiness and easy-to-use when nothing is lost or forgotten [6].

The Internet of Things (IoT) has been integrating into all facets of urban life, the building, factory, hospital, and the healthcare center [7]. The (IoT) network of physical devices, cars, home appliances, and other components has built-in electronics, sensors, drives, and communication networks to allow objects to capture and share data [8]. Each object can be uniquely determined by a device containing embedded computing ability but can communicate through the Internet [9]. The IoT will allow objects to be sensed and remotely controlled via current network infrastructures, thus allowing the physical world to connect with computer-based networks [10]. The IoT makes it possible to sensor or control objects remotely through the current network infrastructure, allowing a closer link between the real world and computerized networks and an increase in performance [11]. The new IoT concept provides an open path to create applications that organize popular traditional computers[12]. IoT wants to use these autonomous resources to communicate and produce related information without human mediation [13]. The IoT happens when ordinary, recognizable objects have linked with microchips [14].

In the last 5-10 years, the availability of open-source hardware has improved IoT platforms and services [15]. The progress of this new

technology has been expected to begin. Students will need to be briefed on IoT concepts and the latest available technology at present, which will require open access to new developments in their future work [16]. A core component of this IoT scheme is the middleware based on the Lora WAN specifications [17]. The technology of Lora serves as a link between sensors outside the Internet and points of entry. In comparison to the used hardware, the program is then picked [18]. The data vary from system to system, so a "data repository" is valuable if released earlier for reliability before further processing [19].

The energy market includes several companies, including Epi-Sensor, Wi-Lem, Wattsup, SATEC, Change Electric, Energy Metering Invention LTD, General Power, Mitsubishi, Siemens, and Schneider, that provide innovative monitoring solutions [20]. Thus, several firms compile data such as Resource Kraft, Google, E-view, and EFT Energy with emergency energy management (EEM) [21]. The total energy monitoring system can be attributed to a wired or wireless system by reviewing supplier-approved procedures that settle on applying developments in internet technology [22,23]. Several metrics can be accomplished to measure and estimate energy demand (e.g., electricity use, power factor, maximum/minimum voltage), suggesting rough conditions for energy scarcity [24].

The paper structure: have the Concept of Intelligent System in Section 2, Internet of Things Section 3, Literature Review in section 4, Discussion and Comparison in section 5, Finally, the conclusion in section 6.

2. CONCEPT OF INTELLIGENT SYSTEMS

The integration of several technologies is bound to be the AI system based on its integration. Innovative human-machine systems information management system will help us make scientific decisions in complex computer problems [25]. Implementing specialist systems technology in this area has achieved some impressive accomplishments in many fields [26]. Acquisition of information and processing have been classified as the most critical problem for expert system creation [27]. The strict differentiation and understanding of individual subjects render the intelligent system challenging to deal with. It is,

therefore, an inventive pattern like neural networks, a fugitive logic [28]. Smart Computing is the latest trend in IT infrastructure as it is a robust technology framework that also incorporates many advanced technologies and has automation, convergence, and security characteristics [29]. It involves big data and the advent of models of services such as cloud computing. The development direction of an energy-efficient home is shown in Fig.1 [30]. Process monitoring carries a significant responsibility; it helps measure and assess the efficiency of measuring systems [31]. With the time that has increased, monitoring input variables to the gains can be sustained. Design monitoring methods are critical for reducing the number of false alarms [32]. Process control means that the processes that work on a system are regulated and allows the user to figure out what processes operate on the system [33]. The work environment of IT professionals is also gradually improved, and some problems have cracked, so calculating the highest management works can be measured and revised, as well as using different series of software calculations [34,35]. The Java languages have provided

practical tools to build an active framework with intellectual skills, contributing to creating information as truth and law [36].

3. INTERNET OF THINGS

IoT refers to the networking of daily objects, which have also fitted with all-embracing knowledge. IoT increases the ubiquity of the Internet by integrating all objects for interaction through integrated systems, which allow for rapid advancements in underlying technologies, leading to a highly distributed network of devices that communicate with humans and other devices [36,37]. IoT provides a wide variety of innovative applications promising to enhance the quality of our lives. IoT's scholars and practitioners worldwide have received much recognition in recent years [38]. IoT gradually becomes an integral part of our lives that can be felt all over us. In general, IoT is an invention that combines a wide range of intelligent systems, frames, and mobile devices and sensors. The energy-sensitive home direction is shown in Fig. 2. [39].

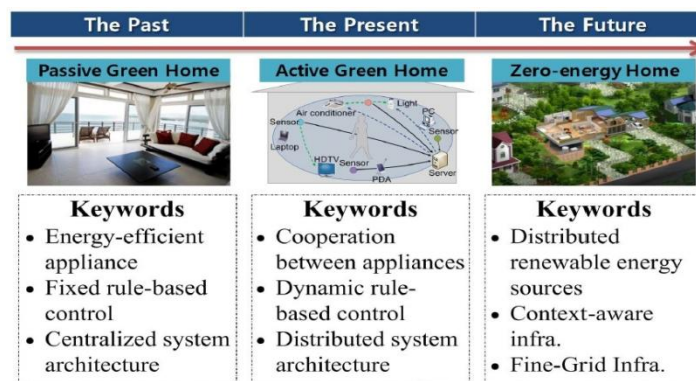


Fig. 1. The development direction of energy-efficient home [30]

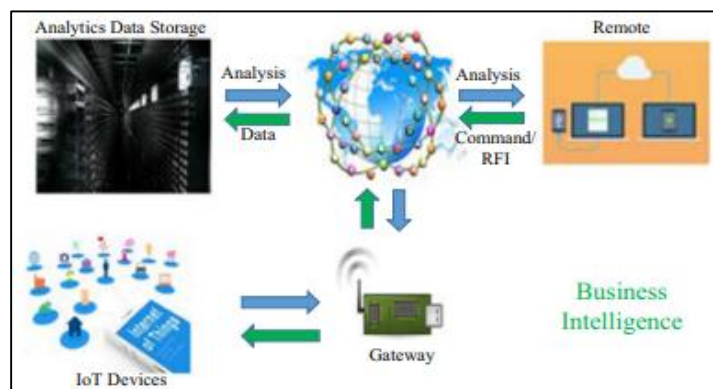


Fig. 2. The business intelligence for a general architecture of IoT [39]

IoT has a multidisciplinary vision to benefit several domains such as environmental, industrial, public/private, medical, transportation, etc. Different researchers have explained the IoT differently concerning specific interests and aspects. The potential and power of IoT can be seen in several application domains. Fig.3 illustrates a few of the application domains of IoT potentials.

In the last few years, several major IoT ventures took over the industry. Fig. 4 illustrates some crucial IoT ventures that attracted the majority of the industry. Fig. 4 shows the global distribution

among the US, European, and Asia/Pacific regions of these IoT ventures. The Americas contributes further to health care and intelligent supply chain programs. It can be seen. In comparison, the European continent's commitment to creative town schemes is more significant [39].

Fig. 5 illustrates the global market share of IoT projects worldwide. Industry, smart city, intelligent energy, and smart vehicle-based IoT projects have a significant market share compared to others [39].

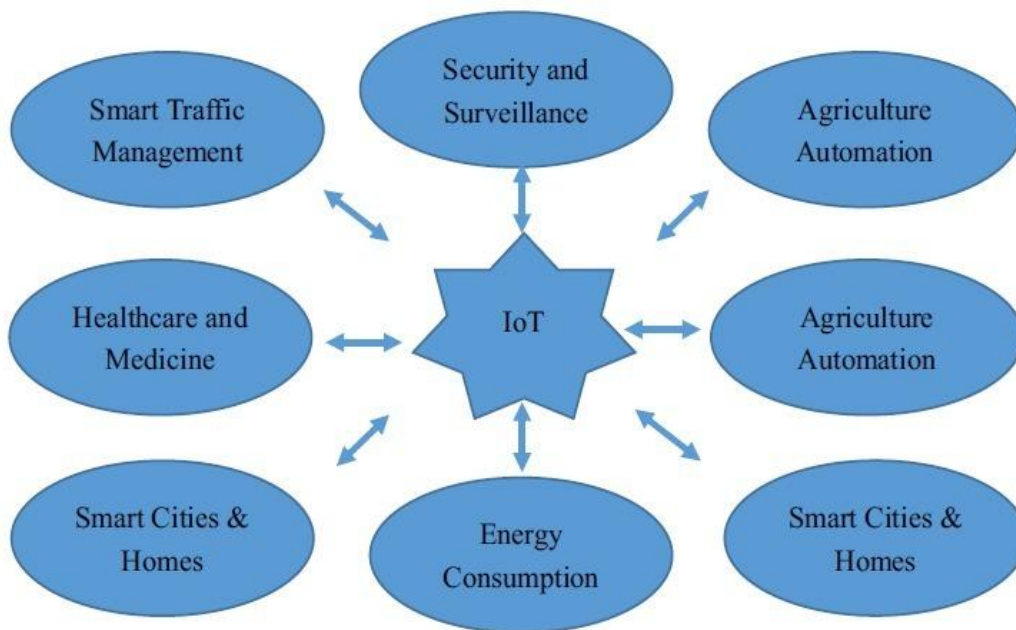


Fig. 3. Some of the potential application domains of IoT

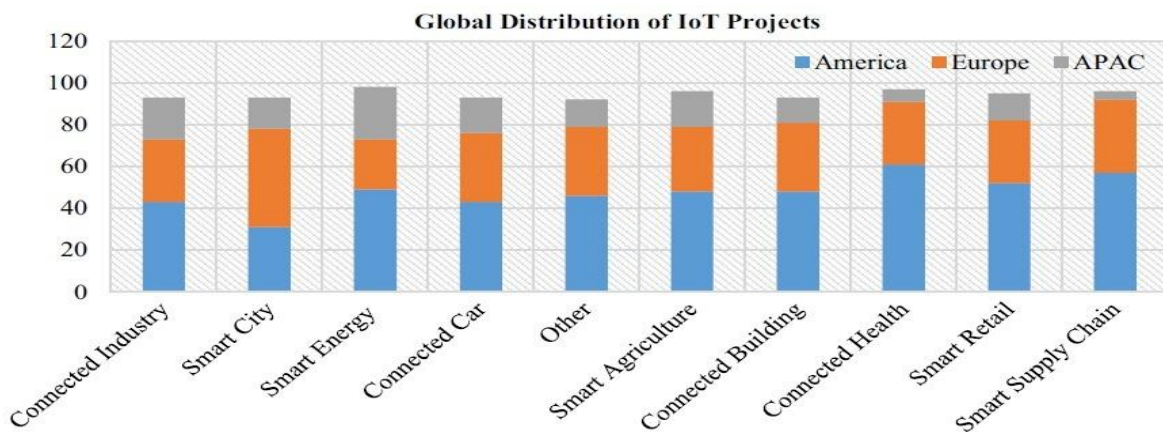


Fig. 4. Global distribution of IoT projects among America (USA, South America, and Canada), Europe, and APAC (Asia and Pacific region)

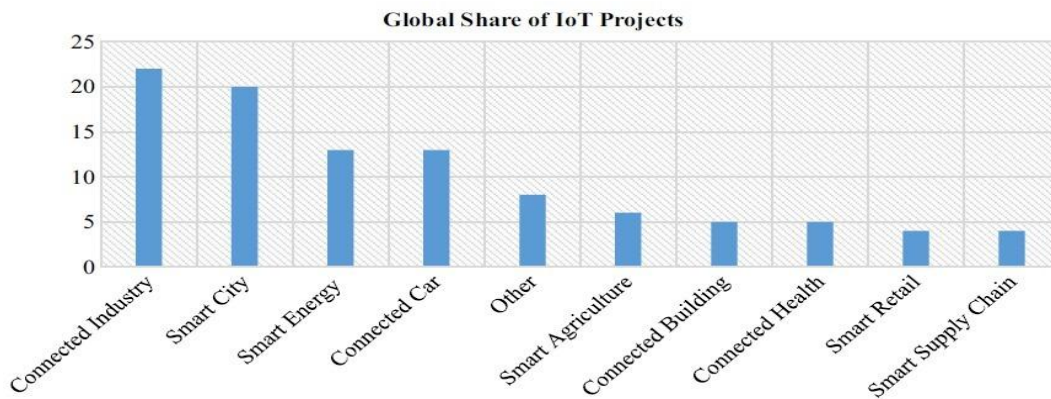


Fig. 5 Global share of IoT projects across the world

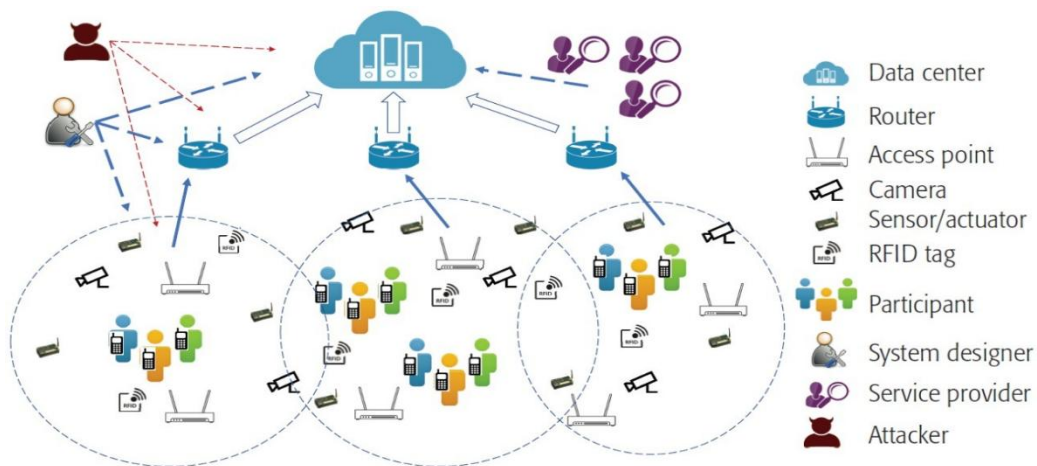


Fig. 6. An example smart IoT system [42]

Smart cities, smart grids, intelligent transmission, smart building, and smart homes are traditional innovative IoT systems [34]. The data support, which achieves complete and detailed coverage for all participants, is a common feature of these systems. These data will now include conventional sensory data, background data, proactively uploaded content, and user interactions [40]. The number of users and service providers in the Smart IoT framework is rising. A device of many contents is being played actively or passively by users [41]. An intelligent IoT system is capable of providing both individually specific consumer services and personalized services. This role is very different from the classical IoT systems and transforms an IoT system into a giant ecosystem from a simple work cycle. Fig.6 illustrates an illustration of an advanced IoT method. The machine builder uses sensors, cameras, and so on and inspires mobile devices to capture linkable content. Then the material is transferred to servers for storage and further processing via the hierarchical structure.

Finally, both device builders and service providers deliver the services based on the content gathered. Attackers may also connect or hack into the device maliciously to filter distributed and stored information [42].

Due to the presence of internet technology, which confirms shifts in market patterns, human activities, communication, transport, factories, etc., several industries that are deemed disruptive and threaten different sectors have been included in the IoT study [43,44]. It substitutes for human functions or changes corporate values that significantly describe different business models [45]. The amount is progressively dispersed and corresponds to the growth of expertise characterized by asymmetric progress [46].

4. LITERATURE REVIEW

In 2018 Kharel, J. et al. [47] proposed and developed an elementary testbed presented. The

machine works under fog computing, which is a wireless IoT technology. The test findings show that the systems proposed can promise to transform the clinical health system into innovative patient-centered health systems and provide seamless health care. The design suggested creating an energy-efficient network that could also be applied when customers and patients need the Internet. Therefore, the focus of this research has been to assess the reliability of the virtual testbed of an intelligent framework for a health surveillance system accessible to all.

In 2019 Samara et al. [48] embedded a new low-cost intelligent PV monitoring system. The monitoring system can make use of a small and powerful artificial neural network. The monitoring system will predict the regular activity of a PV panel based on a collection of environmental conditions using this artificial network. In real-time, the control process for each PV panel output will be implemented. Besides, the control system gathers data on the current state of the area. Using intelligent comparison models based on artificial neural networks, the monitoring system uses the input data to predict the average performance of a PV panel. The monitoring system will decide on the maintenance for each PV panel after comparing the expected and actual outputs. The monitoring system has intended to automate the maintenance request phase by submitting an internet notification to a predetermined administrator or maintenance business. The monitoring mechanism did not include the isolation or removal of the panel.

In 2019 Manogaran, G. et al. [49] proposed a wearable bright patch that transmits datasets to the edges platform using local area networks, including Wi-Fi and Bluetooth with IoT sensors. A Bayesian deep learning network algorithm has been used in edge computing devices to infer and classify various physical data accurately obtained from humans to monitor their physical activities. The initial process of this network is to analyze and derive features or trends from health datasets. The normalized dataset has been processed in order to reduce data consistency and reliability. An input layer, a multilayer or hidden layer, and an output layer make up the device. These layers are linked to the Bayesian network, and each layer is connected to the same and cross layers, resulting in a regression model. With a small subset, this parallels the movement of the human brain. The normalization

operation has been mathematically derived using "Mean (μ) and Standard Deviation (σ)."

In 2019 Tukymbekov, D. et al. [50] considered autonomous smart street lighting systems with prediction algorithms that are energy efficient. The technologies suggested can be easily incorporated into everyday use to reduce the expense of electronic equipment and systems. The systems comprise lamp groups which include three lamps connected to the device by popular electronic. There is a standard battery and control unit for threes. Each of the three lamp-tube has fitted with lighting, movement, current, and voltages modules and sensors. The electricity is converted into electricity and charges the battery common. The control units and the battery of the clustered light bulbs have located on the central bulbs. Via the power cables, the Common Battery charges two adjacent lamps. The sensor data has passed through simple wires into the control unit. All the necessary data are forwarded to network coordinators after this data is received via XBee 3 transceiver modules by the control units. Unlike the previous versions, XBee 3 offers many advantages, such as self-healing, remote modules set-up, and program code writing in Micro-Python (when a single network feature breaks down). The network coordinator data has been received from all clustered lampposts and then sent to the database via the Internet. Data is processed and prepared for network web monitoring, where data from all network nodes can be monitored.

In the same year, Liang H. et al. [51] proposed early-alert data mining-based sand plug fracturing plugs. First, an early warning model is developed for double logarithm curve fracturing sand plugs, and algorithms for time analysis have been used to predict oils and cause pressure in the two logarithmic curve sand plugs of fracture risk advisory models, thus improving early warning accuracy. The GRNN algorithms have been developed to optimize the effects of the time's domain analysis predictions. To increase the accuracy of the following slope calculations, improved affinity propagation (AP) clustering algorithms were used to group the monitoring data so that the coincidence rates of sand plug and fracturing risks are improved. Finally, on-site, we apply and review risk prevention models and verify the validity and consistency of the models. The model is integrated into remote management systems in

which urban office staff perform smart, remote risk monitoring online.

In 2019 Kim, S. M. et al. [52] proposed a framework to enhance the protection and efficiency of Smart City so that an integrated Smart City can be constructed and managed. The intelligent AI system algorithms are used to analyze and track various energy data and device information obtained employing energy IoT devices. The features of each zone, house, home, and plant in Smart City must be understood and AI algorithms designed accordingly to create the proposed systems.

In the same year, Lv, Z. et al. [53] developed a system made up of the primary network and reception terminal monitoring system. As roads and taxis as nodes, the leading control network links street lights. Each node is assigned an address as a single identity in the networks after dynamically organizing the networks. The device developed then carries out simulation experiments to demonstrate that it can fulfill the requirements and forward the collected information in messages to the specified terminals. The sensors coordinated through ZigBee's wireless networks could encourage the building of the smart town infrastructure. The network will provide people with a more competent and comfortable society.

In 2019 Bylykbashi, K. et al. [54] focused on developing non-complex, non-intrusive DMS that decides the driver's situation in real-time, taking various parameters. The criteria included environmental variables and critical indicators of the driver that help to define his actual circumstances. It proposes two systems and implements them. There were three input parameters, one and four others. Three or more parameters that are not associated with each other lead to a complex (NP-hard) non-deterministic polynomial time.

In 2020 Y. Yan et al. [55], The technical implementation method of intelligent connection in a substation has been analyzed. The value of various intelligent relation functions has been reduced, and the Department's intelligent connection functions are explained using simulation instances. This paper will direct engineers to design intelligent power stations with research materials.

In 2020 M. Georgiev et al. [56] A workaround has been proposed for the interoperability of

networks with Modbus TCP Industrial Protocol based PLC and SCADA systems. The RES is usually part of the energy system of the house. It is strongly recommended to include the RES in the house energy system to synchronize with energy consumers and other energy systems like heating and cooling, ventilation, and water usage plants. The solution suggested offers simplicity to the surveillance mechanism and applies the monitoring to different vendor devices.

In 2020 W. Wu et al. [57] Proposed a 5G network intelligent terminal network control system. 5G communications technologies can address automated positioning and district network failure separation and enterprise extension of high-quality video streaming with features such as greater bandwidth, faster transmission rates, and lower latency.

In 2020 L. Chi et al. [58] The option of setting up the EI at a community level was investigated by integrating an intelligent management system at implementation levels with a traditional energy grid. To improve regional energy management and optimum dispatch as a new energy utilization model, the author realizes a deep link between the energy sector and information and communication technology (ICT).

In 2020 M. Koseoglou et al. [59] A centralized microgrid controller and battery inverter, i-plugs, and i-meter data set the viability of the suggested laboratory set-up is validated by an electrical energy management algorithm using a particle swarm optimization (PSO) technique. Some experimental studies show that the suggested research environment in the laboratory is feasible and accurate.

In 2020 M. P. Kokare et al. [60] presented a power meter that uses advanced sensing techniques and IoT to track energy flow in smart grids. These devices can monitor consumers' energy usage in real-time. The current sensor detects the current flow through the devices, and the controller performs the appropriate calculations on the data before uploading it to the Internet. This aids in the reduction of energy consumption and keeps track of the units used. The aim is to make electrical appliances smart and comfortable for consumers and reduce power usage in web applications.

In 2020 M. D. Djordjević et al. [61] In this article, we have addressed implementing an autonomous control and control system for the

electrical power line poles. The Industrial Internet of Things technology is a new approach in smart control systems realistically and importantly. The field of study is the tracking and surveillance of pathways and microclimates using the technologies for the Industrial Internet of Things and intelligent sensor nodes.

5. DISCUSSION AND COMPARISON

In this review, many works were compared. Each work focused on using a monitoring system in the exact field below a discussion of each work [47]; mobile health control systems are provided in areas where the Internet is not accessible. The new schemes would also support individuals living in areas where health facilities are lacking. It helps patients who need a daily check for their bodies vital and helps patients who want to monitor their physical lives quickly. The proposed system would also favor countries that have a lower doctor-to-patient ratio. Moreover, the proposed scheme also benefits the countries with a lower doctor-to-patient ratio. Besides, the proposed architectures will reduce the cloud burden and help build a health monitoring system that is energy efficient. While [48] tested the network efficiency by taking 42 cases and beginning training it, entering the networks, and predicting capacity. The neural networks optimized son atmega256 microcontrollers to implement the system, and then neural system simulation evaluated against time. The same results came from streamlined implementations, which are almost as accurate as 98 percent in simulations. The optimized implementations allow an average time of 1ms to be achieved using a 16MHz frequency microcontroller. The error was calculated with the IoT sensor as the discrepancy between observed and unnoticed health data collection. The error calculates the health dataset(values), observing with total estimates (P-values) or processed datasets. These layers have been incorporated into the Bayesian networks in this study. The matrix is interpreted numerically in the matrix, and each layer has connected to the same cross-layer. The normalization operations are derived mathematically by "Mean (μ) and standard deviation (β)" to minimize error rates. Hidden layers were processed using the gain ratio via filtered output (GR). [49] proposed street lighting systems models are capable of keeping the day gloomy or precipitated. The data gathered can be used to calculate device energy consumption employing neural networks under different weather conditions. [50] suggested an early

warning system for the possibility of sand plugging based upon a 2-fold logarithmic curve. First, the GRNN-algorithm and the combined time field analysis were used to estimate the oil pressure and case pressure parameters in the sand plug slope alarm double-cut logarithmic curve. The path is then changed to locate and evaluate the sand plug, alerting sand plugs early. Finally, the improved AP clustering algorithm was used to isolate the curve strain, followed by a curved fit, and simultaneously calculate the pull of the configured curve to maximize the accuracy of measurements of the curve trap. The enhanced sand plug risk warning model appears to be more precise and faster and has a strong prospect of industrial use. In the remote system implementation, the proposed early warning model allows city officials to control on a remote basis. [51]They offer smart, heterogeneous PV panel systems with the perfect precision of forecasts. They also addressed hardware design and monitoring systems implementation for low-cost microcontrollers. The monitoring system's ability was great to define any individual panel requiring maintenance. The lower the extra cost per PV panel is for several PV panels connected to the monitoring systems. For maintenance, the monitoring system will flag a PV table if there is a percentage difference of more than 1 percent between the expected output power for the panels obtained from artificial neural model systems and the actual output capacity of the panels obtained by the sensors. [52] proposed systems allow Smarts City Infrastructures to be optimized by secure and effective management of all forms of energy data in Smarts City. Moreover, the cans of all SMEs, such as transport, environmental, logistical, medical, public, and energy, can be used if the proposed system is being built and utilized. With secure and efficient data management in every area, we expect safety and efficiency to be resolved, the biggest challenge of Smart City construction now. [53] developed an intelligent urban environmental monitoring system based on ZigBee's wireless networks to complete real-time sets of knowledge about urban environments. The systems consist of the basic network monitoring and the remote reception terminals. The fundamental networks of monitoring bind streetlights as roads and taxis as nodes. Each node is then assigned an address as the only identity in the networks after dynamic network organization. The systems developed then carry out simulation experiments to demonstrate that they can fulfill requirements and submit the collected information in the message format to

Table 1. Comparison among previous approaches used innovative control methods

Author	Problem	Technique	Procedure	Properties and tools	Result
Kharel, J. et al. [47], 2018	Lack of clinical surveillance system	the modern architecture of intelligent patient-centric health systems Wireless in network architecture depends on With LoRa as connectivity, and an FC allows remote control of user information kilometers	The Wi-Fi, GSM/GPRS, 3G, and 4G network access servers are developed.	Windows PCs have been used, and heart rate data received are monitored in a real-time way	the device can provide remote health monitoring services where the Internet is unavailable. Systems can support individuals residing in areas where health facilities are lacking.
Samara, S., &Natsheh, E [48], 2019	It is remaining the photovoltaic panel system in its best condition for harnessing reliable energy efficiently.	artificial neural network	Predicting the actual output using PV panel reference models based on sensed inputs,	monitoring systems ATmega256 microcontroller, Onboard ESP8266.	The result after implementation is identical to the result obtained through simulation with an accuracy of at least 98 percent.
Manogaran, G. et al. [49], 2019	Deficiency in significant nutrients leads to the deterioration of organs, which creates various health problems, particularly for infants, children, and adults.	Wearables with (IoT) sensors have been designed as brilliant log patches.	Gaussian factors have been added from the input layers to the output layers to increase prediction accuracy and reduce energy consumption.	Bayesian neural networks (EC-BNN) and agile learning for real-time data analysis using IoT sensors	For further scaling of the equipment, the progress of edge computing on the Bayesian neural networks (EC-BNN) and the Intelligent Internet of Things is expected.
Tukymbekov, D. et al. [50], 2019	The algorithms of the systems chase various modes of operations as they adjust to the weather conditions.	considers three different situations	The system's most critical function is its dynamic sensitivity to environmental conditions.	End machines, routers, and control units consist of controllers, transceivers modules, and sensors; controllers are	There have been built self-learning intelligent predictive algorithms. Algorithms for the distribution of energy

Author	Problem	Technique	Procedure	Properties and tools	Result
Liang, H. et al. [51], 2019	Missed judgment caused by relying on artificial monitoring	Data mining is used to propose an early warning system for fracturing sand plugs.	The time series time-domain analysis algorithm and the GRNN algorithm are combined to create a doubles logarithmic curved slope fracturing sand risk alert model.	ATmega328PU, infrared movements sensor, and INA219 current and voltages sensor. Using GRNN algorithms, the time series analysis algorithms for fore oil pressure are improved, and the expected results' coincidence rate is set.	between lampposts have been established using weather forecasts for the next four days. Models for sands plugs danger alert tend to be more reliable and quicker.
Kim, S. M. et al. [52], 2019	Resolving urban issues.	Propose an artificial intelligence-based framework for tracking energy data.	The intelligent part of this system is a data analysis system with AI algorithms, which analyzes the collected data to look for anomalies.	In real-time, on smartphones and tablet PCs, set the scope of user authority to access the analyzed data.	The proposed system would increase Smart City's safety and performance, allowing it to construct and run an optimized Smart City.
Lv, Z. et al. [53], 2019	resolving issues with the urban environment	Centered on the ZigBee wireless network, build an innovative urban environment monitoring system.	Operation System Abstraction Layer (OSAL), The systems adopt the polling mechanisms to completes the management for each task.	Cell phones and Web receivers are used as remote control terminals in these systems. TCP protocols are used by cell phones to receive data, and WEB receivers use TCP protocols.	The systems will look for data such as temperature, humidity, and shaking levels around the nodes.
Bylykbashi, K., [54], 2019	A scheme for safe driving has been proposed.	proposes an intelligent Fuzzy-based Driver Monitoring System (FDMS)	FDMS1 and FDMS2 are two fuzzy-based systems that were compared. FDMS1 considers (VET), (NL), and other factors when making a decision (HR).	Vehicular Ad-hoc Networks (VANETs), DASs, and DMSs are intelligent systems inside the vehicle.	The impact of the considered parameters on determining the driver's situations was demonstrated through simulations and experiments.
Y. Yan [55], 2020	The substation has evolved into an intelligent energy station.	The intelligent linkage of each subsystem	the basic framework of an intelligent energy station's auxiliary equipment control	The technological realization mode of intelligent linkage in a substation combs the	Provide an engineering guide for the smart energy station's design.

Author	Problem	Technique	Procedure	Properties and tools	Result
M. Georgiev[56], 2020	To integrate RES in the house energy system to have synchronized work with the energy consumers and the other energy systems like heating and cooling, ventilation, and water consumption facilities.	VICTRON Energy Solar	embodies the ubiquitous IoT of power equipment. system with holographic vision, independent inspection, remote monitoring, active early warning, and intelligent decision-making functions Households' use of renewable energy sources (RES)	importance of various intelligent linkage functions and illustrates the department intelligent linkage functions using simulation cases. propose a solution for ensuring device interoperability through the use of PLC and SCADA systems based on the Modbus TCP industrial protocol	a clear requirement of good monitoring in all directions of energy systems - output, build-up, and consumption of energy
W. Wu and Y. Zhu [57],2020	The master station uses polling to communicate with the substation.	socket technology	For the 5G network, an intelligent terminal monitoring system of the delivery network is being created. 5G networking technology has more significant latency, higher transmission rate, and lower delay.	Socket infrastructure is used for communicating with the data acquisition servers from the wireless networking module. A balanced data transfer using the IEC 60870-5-101 protocol is used to resolve the problem that only the substation's data can be requested by polling.	solve problems including automated positioning and isolation of delivery network faults, as well as high definition video transmission market expansion
L. Chi et al. [58], 2020	integration of the energy sector with the information and communication technologies (ICT)	EI	The energy industry and information and communications technology are deeply intertwined, as EI recognizes (ICT)	Extensive research on the EI historical, philosophical and technical paradigm is carried out.	Deep integration of the energy industry with ICTs is achieved to optimize regional energy management and optimum shipping
M. Koseoglou et al.	a laboratory research setting for success assessment	particle swarm optimization (PSO) technique	Intelligent metering (i-meter), smart connectors (i-plugs) and smart	A low-complexity RESPE is suggested based on the application of two induction	The reliability of a virtually zero-energy construction (nZEB)

Author	Problem	Technique	Procedure	Properties and tools	Result
[59], 2020			contacts (i-links) and uncontrollable loads.	machines. An i-meter monitors every microgrid power node, while an i-plug monitors every load.	microgrid is measured using power-hard in-the-clops (Phil) simulations.
M. P. Kokare and S. Pawar [60], 2020	present energy meters with two-way contact	Cost-effectively, track electricity among the various nodes.	Monitor energy consumption at the domestic level. Reducing energy consumptions and monitors the units consumed.	Reduces energy usage and keeps track of the units used. The aim is to make electrical appliances more competent and more comfortable for consumers, as well as to reduce power usage in the internet application	Depending on the situation, adjust the direction of energy flow. This meter aids in the efficient monitoring of electricity among the various nodes.
M. D. Djordjević et al. [61], 2020	Powerline pole supervision	Global System of Mobile Telecommunications (GSM) module with General Packet Radio Service (GPRS) is a communication protocol.	Oversight and tracking of slope and microclimate angles using Things Technology Industrial Internet and intelligent sensor nodes	This device consists of a collection of integrated sensors (environmental: BME280, BH1750, and ADXL345 three-axis accelerometer) and a peripheral interface microcontroller (PIC)	New methodology in the realistic and essential application of the Industrial Internet of Things technologies in the Smart Control Systems System

the specified terminal. [54] demonstrated the effects of both the FDMS1 and FDMS2 of the considered parameters on drivers' situation determination. It also describes how the importance of the output is transferred to action to help drivers safely. By displaying the two FDMS1 and FDMS2 schemes, the driver's knowledge of the situation will be decided. For FDMS1, we considered the temperatures and noise levels of vehicle environments as input parameters for the driver's core. These parameters were used as input parameters for FDMS2, along with the driver's respiratory speeds. The impact of the considered parameters on the determinations of the driver's situations was demonstrated through simulations and experiments. [55] the ubiquitous IoT of power equipment, which is one of the key technologies promoting intelligent operation and maintenance of substations, is embodied in the secondary system of a smart energy station by the intelligent linkage of each subsystem. This paper examines the technological realization mode of intelligent linkage in substation, combs the importance of various intelligent linkage functions, and demonstrates the department intelligent linkage functions using simulation cases based on the basic structure of the auxiliary equipment monitoring system in the smart energy station. [56] synchronized collaboration with energy users and other energy systems such as heating, cooling, ventilation, and water use. That is why there is such a strong demand for good energy system monitoring in all directions - output, accumulation, and consumption. The problem with constructing an effective monitoring system is that most vendors have their systems for monitoring their equipment, and interoperability between vendors' equipment is typically difficult [57]. Socket technology is used to communicate between the wireless communication module and the data acquisition server. Balanced transmission is used to achieve IEC 60870-5-101-based data transmission, which resolves that the master station can only request the data from the substation by polling [58]. reviews and conducts in-depth research on EI's context, philosophy, and technological model and discusses how EI can be implemented in real-world industrial parks [59]. The remote system connected to other devices using different networking protocols like Modbus CAN Bus and other devices. A unified master control system controls the microgrid process and collects data on the battery inverter, i-plugs, and i-meters.[60] Measure the current system flow, then the controller performs the

necessary data calculations and puts those data on the Internet. The use of an intelligent meter changed the way energy is exchanged in the grid. The direction of the energy flow according to requirements can now be changed. This meter enables the efficient monitoring of electricity between the various nodes.

6. CONCLUSION

Intelligence is a small matter of time, fast discovery, and exact results—the essence of using the intelligence in monitoring method. Concerning our review of the literature as mentioned above, we found that using AI can take the principal rule in many sectors such as the agricultural sector, manufacturing sector and the health care sector, the building of intelligent cities, the army, and many more, Impacts from entertainment, trade and health care on most facets of the everyday world of life. The use of artificial intelligence (AI) will bring significant changes in all areas are pretty optimistic. AI technologies are widely believed to promote and improve human work and not replace doctors and other medical workers. AI is ready to serve a range of activities from administrative workflow to clinical reporting and patient outreach and specialist assistance such as image processing, automation of medical devices, patient surveillance, etc. So, from this point on, we have focused on how this can affect the edge of each one.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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