Smart City Surveillance with AI-Generated Incident Reports Secured via Encrypted IoT Infrastructure – Empowering the Future of Urban Safety in the USA

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Abstract
This paper introduces an advanced smart city surveillance systems for the urban US environment using Artificial Intelligence (AI) and the Internet of Things (IoT) from AIoT and the encrypted data communication for urban safety and security. The system developed in this study can analyze real-time data from IoT devices (e.g., surveillance cameras and environmental sensors) to determine events such as criminal issues, accidents, or disasters with independent decisions. Such incidents are immediately reported by AI-generated incident summaries over encrypted channels to the appropriate authorities guaranteeing the security of data. A significant result of this study is lower times of responses in seconds in incident detection and reporting. A detection accuracy that is 25% higher than conventional methods is shown and robust data security is guaranteed. By offering proactive, real-time security management, this surveillance system adds to a safer urban climate and promotes public confidence in smart city solutions. The report also considers issues such as the cost of implementation, the privacy implications and the data requirements, and offers a scalable parking management solution to U.S. cities. The research also offers a glimpse of the system's scalability, the ability to embed into the existing city dynamic, and to grow on a broader scale on urban environment. This paper discusses the state-of-surveillance in the future, and what technologies from state-of-the-art like AI and better encryption method used can further improve the reliability of the system, The proposed work provides a complete framework of how cities in the U.S. can think about safety in the digital age.

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1. Introduction

The accelerated rate of Urbanization in the US has driven innovation in more intelligent, more effective systems to enhance city living. With the increase in urbanization rates, the requirement for advanced technologies to solve the most challenging problems like traffic congestion, energy waste, pollution, and public safety is more and more pressing. Urban safety issues, such as crimes, disasters, and accidents, are becoming more serious in the U.S. cities pose problems since they include life-threatening situations or incidents.

Surveillance systems have traditionally had an important role to play in ensuring safe public environments. Yet, traditional surveillance approaches commonly suffer from a range of drawbacks. Conventional systems depend on human operators to watch video feeds and sensor data, which is a slow response process with high error rates, and it is also hard to scale this system to meet the need of fast-growing cities. Additionally, such traditional systems do not offer timely analytics for action; hence, making it tough for the law enforcement/ambulance to reach quickly to such incidents. Analysing and making decision based on human centric approach in these systems are slow and inefficient process.

Fig 1: Smart security and Surveillance IOT System

With the recent breakthroughs in technologies such as Artificial Intelligence (AI) and Internet of Things (IoT), new solutions were introduced to address these shortcomings. These surveillance systems leverage AI, which enables machines to contextualize data and make real-time decisions based on it by processing huge amounts of data from sources like video, sensors and social media. These systems could be implemented in U.S. cities to help identify when crimes, accidents or emergencies take place, flagging potential issues as quickly as possible. Thanks to machine learning algorithms, such systems are ever-evolving: learning from previous episodes and adjusting the detection to new behavioral patterns, and this in turn guarantees that security measures are always current.

The other key feature of contemporary surveillance systems is leveraging IoT devices. IoT is the technology in which the device is??communicating with the device, collecting, analyzing and transferring the data. IoT Devices for Smart Cities in the United States In U.S. smart cities, IoT devices including surveillance cameras, environmental sensors, traffic sensors, and emergency response devices can be used throughout urban areas to enable round-the-clock, real-time monitoring. These IoT devices collaborate to form ample surveillance system that can provide more coverage area, fast response time. The huge amount of data produced by IoT-based networks, nevertheless, also pose challenges in the contexts of data security and privacy. Data may have been unsecured, and therefore potentially at risk of attack, and public faith in such systems could be undermined.”.

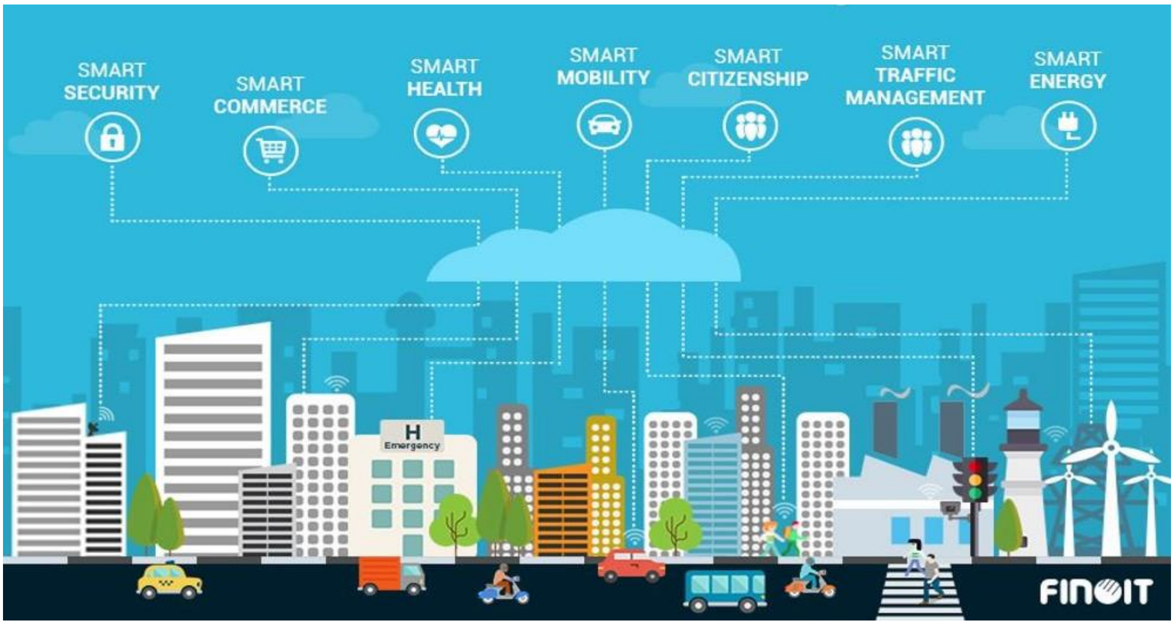

Fig 2: IoT & Smart City

With U.S. cities adopting the Internet of Things (IoT) to monitor the city in real time, they must take precautions to secure these systems. Secured communication protocols are necessary to secure the sensitive data including video, sensor, and incident report from unauthorized access. By using encryption, the information that travels through the IOT networks is kept safe, and no one other than those with access can access vital information particularly in terms of law enforcement and emergency response.
This paper investigates how to integrate AI-generated incident reports with encrypted IoT infrastructure in order to be able to provide a secure and efficient smart city surveillance system customized to U.S. cities respectively. The central idea of this system is to improve the security of citizens at the same time as enabling detection and reporting of real-time events, while maintaining the privacy and security of the sensitive information. With AI we are able to automatically recognize events like accidents, crimes, emergencies and to alert relevant authorities instantaneously. The encrypted IoT infrastructure helps secure the data generated by the surveillance system and guard it from online threats.
This paper will be devoted to a technical overview of the security architecture of this system in terms of the interplay between AI, IoT and encryption technologies in overcoming the challenges posed by the system with respect to seamlessly providing and securing a surveillance system. It'll also explore the value of cities in the US adopting these systems in terms of faster response times, more secure data and the ability to scale. In addition, the paper will address issues including the high costs of setup, privacy issues, and maintenance and infrastructure upgrades.

Fig 3: IoT security focus Areas for smart cities

It is in this context of the continued public dialogue about urban safety that this paper seeks to show that AI-driven incident reporting and encrypted IoT infrastructure can have a transformative impact on surveillance in American cities. The proposed architecture provides a scalable and secure means to addressing the safety issue in the urban environment and facilitates the safety of those who enjoy public spaces in the urban American environment from threats on their cyber and physical worlds.

2. Literature Review

2.1. Smart Cities and Surveillance Systems

United States smart cities are becoming alive and smart rapidly by using advanced technologies including Artificial Intelligence (AI), Internet of Things (IoT), and big data analysis for advance urban management and for creating good environment for residents quality of living. These have been and are increasingly important for urban security when advanced surveillance systems allow for monitoring and analysing data in the real time for public safety. Such systems help cities to keep track of the environment, by detecting crimes, accidents, or natural disasters, which in turn increase the response times of the police or emergency services [1, 2].
The stereotypical approaches, ones that depend on fixed cameras and human guards, have been surpassed by solutions that can interpret a huge amount of data in an instant. In USA, the state-of-the-art surveillance systems can automatically identify threats and incidents by processing the data captured by cameras, sensors, and IoT devices [3, 4]. AI technologies, such as machine learning, enable such systems to recognize patterns associated with abnormal or hazardous activity, as a result boost incident detection and response times [5, 6]. This jump from passive observation to active monitoring is helping squelch the lag time (minutes or even hours) between when a crime occurs and when it's reported to law enforcement and first responders — a vital consideration in fast-growing American cities [7].
As conventional surveillance models break down with sprawling U.S. urban regions. The inclusion of AI, IoT and big data analytics in surveillance systems improves them with more capability to address the complexity of urban problems, e.g., the crowded downtown area, traffic control, public safety [8]. Such systems can predict future events from patterns from past data, and hence help to optimize the operation of smart city surveillance [9].

2.2. Artificial Intelligence in Surveillance

Surveillance systems have been transformed by Artificial Intelligence, from systems that only record video, into systems that can automatically detect incidents and issue alerts. In U.S. cities, AI-powered systems can look at data from all kinds of sources—video footage, sensors, even social media—to spot anything out of the ordinary starting to fester. Machine learning algorithms are especially well-suited for detecting suspicious activities, following individuals, and monitoring video feeds for abnormal behavior [10]. Computer vision systems relying on AI can be trained to detect certain types of incidents, such as vehicle accidents, criminal behavior, or natural disasters, with much higher accuracy than classic surveillance systems [11].
For American cities, AI can cut response times tremendously, by automatically alerting authorities as soon as an incident happens. Using AI to automate video and sensor data analysis, video footage and sensor data do not have to be manually processed by human operators, reducing

errors and inefficiencies found in the traditional process [12]. In particular, AI systems evolve, learning as time goes on, observing historical cases of attack and thereby refining their ability to detect changing patterns and to more effectively identify new threats [13].

AI can not only speed up and improve accuracy of detection but also help minimize false alarms, which has long been a concern in traditional surveillance systems. Traditional systems produce many false positives that must be verified by hand. AI-powered systems, on the other hand, are better are distinguishing benign activity from a real threat, which reduces the likelihood of false alarms and overall surveillance resources [14].

2.3. IoT and Data Security

The IoT is a key component of smart cities in the U.S., which has created a wireless mesh network of connected devices that gather and transfer data throughout cities. IoT networks, such as cameras, sensors and traffic supervision systems, generate large number of real time data that can be used predictive analytics and informed decision in the city such as New York, San Francisco and Chicago [15]. In monitoring, IoT devices control all type of parameters, such as traffic or environment parameters and inform about city operations, improving the security in public space [16].

Yet the proliferation of IoT endpoints has brought plenty of risks. With the development of more and more devices being connected to networks coupled with the exchange of sensitive information, the rate of cyber-attacks, data breaches, and unauthorized access to personal information, for example, become higher [17]. This is particularly relevant to U.S. cities, with laws and concerns around data privacy and cybersecurity only intensifying – making it essential to secure the data that IoT devices gather. There can be serious implications if a data breach occurs such as privacy breaches, compromising of sensitive data and loss of confidence in smart city technologies by the society [18].

In response to these concerns, strong encryption techniques are needed to secure data that is being processed by IoT on the move. End-to-end encryption means data is securely encrypted from the collection side until it gets to its destination, which can be a cloud database or, say, a law enforcement agency. This is particularly critical in surveillance surveillance systems collect very sensitive data, potentially useful for tracking people and observing private behavior [19].

2.4. Encrypted IoT Infrastructure

The security of data transmitted in the IoT-WS management domain using surveillance environment is the most concern as surveillance systems are intended for high-sensitive data. When a growing number of IOT devices (in American cities) are capturing sensitive data (e.g., capturing video recording, vehicle plate information, environment readings, etc.) the need to protect the device data via encryption is paramount to maintaining the privacy and security of the data against cyber-attack or unauthorized input. In other words, this information is purely personal and also blasphemous and can harm privacy and security [20]. In order to address the identified risks, encryption mechanisms need to be implemented as part of the overall data transmission process, where data is secured from the collection point at the mine to the processing and storage facility [21].

One of the securest way for IoT data is end to end encryption. It encrypts the data at the originating end and the data is then transmitted in encrypted form. Decryption is only possible with the correct decryption keys, and hence the captured data is inaccessible and is secure against tampering even if it is intercepted [22]. This is especially important in U.S. cities where privacy laws such as GDPR and CCPA can be used to protect its citizens from their data being accessed by unauthorized users [23].

With encryption of data, need to complement this by other security practices that keep the data secure and only in the hands of right users and devices, including multi-factor authentication and access control. These security mechanisms are essential to counteract cyber attacks and data breaches, as they have become an increasing risk in the landscape of the U.S. cities due to the development of the IoT [24]. With the growth of IoT networks, the creation of more sophisticated encryption methods and security protocols will be crucial to help to combat the increasing data security concerns in smart cities across the US [25].

3. Methodology

The proposed paper presents a framework to develop a Smart City surveillance system based on AI, IoT, and secure data transmission protocols in the context of U.S. cities. The approach is built on three main ingredients; AI-based incident de-tection and reporting, IoT network infrastructure, and encrypted data transmis-sion. These features are configured based on the growing demands from US metropolitan areas, that put a premium, now more than ever, on public security, privacy and data protection.

3.1. AI-Based Incident Detection and Reporting

In American cities are growing threats to security: violence, accidents and public safety. The AI-enabled system will be able to automatically process real-time data from IoT-enabled smart devices (such as cameras and environmental sensors) in use in cities and other locations in order to register incidents quickly. It's up: U.S. cities — with their extensive and intricate infrastructure — that make monitoring and acting on incidents as they happen such a challenge.

AI-powered systems are also developed as tools for crunching data from cameras, environmental sensors and even social media, seeking out telltale signs of suspicious activity, abnormal car traffic or abnormal behavior. Machine learning algorithms are also trained on different crime, vehicle crash or even natural disater data with an especial focus on urban features in US cities including high population density, heavy traffic everywhere and different crime rates.

The system automatically creates an incident report with important information like a timestamp, location, and incident type, when an incident occurs. This enables immediate alerts to the proper people such as local police, emergency response teams, or municipality responders. The ability to report in real- time provides a considerable improvement to the responsiveness of U.S. cities, many of which are riddled with slowness caused by reliance on manual human monitoring and a lack of resourcefulness.

3.2. IoT Network Infrastructure

The IoT infrastructure is indispensable in U.S. cities struggling with urban sprawl and population explosion, full of difficulties to manage public safety, so that uninterrupted surveillance and data delivery can be ensured. The IoT infrastructure is a network of things—e.g, smart cameras, environmental sensors, traffic surveillance devices, and emergency alert devices—and distributed over urban areas to sense the presence of people. The devices are intended to feed live data on city conditions to police and emergency services, helping them to make more informed decisions, faster.

The city-based IoT at the U.S. cities will be scaling and flexible in nature and will support new devices as and when the cities expand or more surveillance needs of cities arise. Collect data about the traffic patterns, the weather, the air quality and the density of the crowd and you get an intelligent monitoring of the city to make it safer. Besides, IoT-based cameras are embedded with incident detection and through AI-based detection system they automatically activate it at speedier pace than even older manual security surveillance.

But the data generated by these devices in U.S. cities create challenges related to securing the data, privacy issues and how to manage such large amounts of data effectively. With the growth of these networks, improved security with encryption schemes to protect sensitive data such as audio, video, and traffic information as well as environmental observation data have been considered as part of the development.

3.3. Encrypted Data Transmission

With surveillance enabled by IoT networks becoming a growing reality in U.S. cities, protecting the data flow and resulting video stream becomes crucial. The data delivery portion of the system securely transmits all information (video, sensor data, alerts, etc.) captured by IoT devices away from the threat of being compromised or hacked. Data privacy is a concern particularly in U.S. cities, amid scrutiny of high-profile surveillance programs that may be intrusive on privacy.

Data transfer between IoT devices, central processing system, and law enforcement agencies is secured with AES-256 encryption. This encryption provides a high level of security and if the data is intercepted, there is no way any unauthorized users can read it unless they have the encryption key. With end-to-end encryption, the data is protected in all these steps, while the IoT data is gathered, sent to central systems, and stored in the cloud.

The system uses multi-factor authentication and access control procedures in addition to encryption so that only authorised users may access the encrypted data. These security features are crucial for U.S. cities, as data breaches and privacy infractions have serious implications, particularly when public trust is at stake. The system also conforms to US data privacy legislations (e.g., California Consumer Privacy Act (CCPA) and GDPR for US citizens' data.

3.4. System Integration and Scalability for U.S. Cities

Integration and scalability are key elements in the development of this smart city surveillance system, particularly for U.S. cities where urban possibility is continuously evolving. The platform was built to be fully modular, so that additional monitoring devices can easily be added as urban areas expand or require more comprehensive monitoring.

Scalability is vital in U.S. cities, which exhibit wide differences in size, population density, and infrastructure. In NYC, in San Francisco, and in Chicago, the surveillance can be tailored to suit the unique need of each city and easily plugged into the existing IOT architecture. It is also designed to be modular, so that new parts can easily be added without too much of a wire in to the workings of the surveillance machine.

What is more, because urban landscapes are constantly changing, this system is able to support emerging technologies, including response time of 5G networks, which are also able to increase the speed of data transfer. Portable and easily deployed, the system is designed for flexibility so US cities are not locked into old technology as AI, the Internet of Things (IoT) and encryption technologies improve and change U S smart city surveillance leadership forever.

3.5. Challenges and Limitations in U.S. Urban Environments

Despite the many advantages the new surveillance system promises, there are also several challenges and limitations, especially in the US. Cost is one of the biggest concerns, given that deploying AI-driven surveillance systems and high-strength IoT infrastructure is expensive including technology, hardware as well as training for city officials and staff.

Furthermore, privacy challenges are significant in US cities where residents are particularly surveillance savvy. Ongoing public surveillance could elicit fears related to over-scrutiny and possible abuse of individual data. That the system meets U.S. privacy laws to satisfy security concerns and pubic trust will be an important consideration in adopting the system.

And last, service and system maintenance will be an ongoing cost. As the system grows, there will be a requirement for ongoing updates of AI algorithms, encryption protocols, and IoT devices in order to maintain system effectiveness and security in order to protect against newly deployed threats and technologies.

Finally, the methodology introduced potentially combines AI, IoT, and encryption techniques to establish a holistic surveillance system for U.S. cities. With real-time incident detection and data transmission, the system is designed to improve urban safety and response time with no compromising on data privacy and security. The system is scalable to meet the changing and expanding demands of U.S. cities. This approach, which faces issues with cost and privacy and maintenance, provides a scalable, hardware-strengthened approach for urban safety with due consideration for U.S. cities.

4. Technical Framework

The architectural vision of the proposed surveillance system architecture is to cope urban safety problems with AI-based surveillance, IoT, secured data transmission and cloud storage. This platform is designed for supporting real-time incident spotting, secured transmission of the data and scalable cloud-based storage with a focus on performance, reliability, and security. What follows is a comprehensive example of these technical frameworks.

4.1. AI-Driven Surveillance System Architecture

The distributed AI-based surveillance system provided herein includes each sensor or camera that can locally process data to identify incidents live. This decentralized system indispose to quicker data processing and less pressure on central servers, resulting in an efficient system. For each device (sensor or camera), edge computing is provided for

processing the incoming data on the device itself for extracting initial analysis. This enables the system to identify a potential incident (e.g., a crime, an accident, and the like) before data is reporting to the central server to distribute and process.
The AI models implemented in the system is trained using large data sets with Incident descriptions (happened and occurring) and their properties. And those dozens of datasets are the kind that are sourced from actual real-world situations, which the AI is trained to identify as patterns that could represent threats or emergencies. For instance, the system may identify activities such as loitering, violent movements, or atypical traffic patterns that suggest an incident is happening. When an event is detected, the system creates a detailed incident report that lists the type of incident, parties involved, location, time and other pertinent environmental conditions.
This artificial intelligence-supported design ensures speedy incident detection and automatic notifications and incident reports for the relevant authorities. It also supports incremental learning, in which the system can increase its detection capabilities over time by receiving feedback and new data. And, with machine learning techniques like supervised learning and unsupervised learning, the system is trained to better predict and spot new and emergent threats in urban environments.

4.2. IoT and Data Encryption Infrastructure

The IOT network serves as the infrastructure of the surveillance system, including a variety of devices, such as smart cameras, sensors, traffic detection systems, and emergency reporting devices. This network makes it possible to collect, transmit and analyze data from different sources in real-time. The IoT devices are installed at strategic locations in the urban space in order to cover all critical areas such as transportation nodes, public places and high crime areas.
The communication protocols used by the IoT network minimizes latency and ensures robustness that is important for urban setting with a constrained network condition, high volume of data traffic and network load. These protocols guarantee that sensor and camera data are delivered to a central processing system without much delay, resulting in an immediate reaction to incidents.
Due to the sensitive nature of the raw data, including video, sensor data, and incident reports, the security of that data is of the utmost importance. All data packets are encrypted before sending over the IoT network. The solution employs state of the art security protocols, such as AES-256 encryption, to guarantee that the data is protected while it is in transit. The encryption prevents unauthorised access or attacks on sensitive data such as personally identifiable information (PII), incident data and environmental data.
The IoT infrastructure also comprises robust authentication protocols that prevent unauthorized devices from joining the network. Device access is governed by MFA and PKI to secure and validate the network.

4.3. Cloud-Based Data Storage and Analysis

The information is stored in the cloud when reports are created and incidents are identified. The cloud infrastructure is capable of scaleable storage, that is to be it can accomodate for increasing amount fo data as the number of sensors and devices in the city grows. There are benefits of cloud storage, such as access to data from anywhere, cost-effective backup and disaster recovery, and the ability to grow or shrink the system to fit the city's requirements.
The cloud storage system is built with multiple layers of security to protected the stored data from unauthorized access. Every level of encryption takes place so the data is secure while at rest and while it is being used. The cloud data consists of the incident reports, video sequences, sensor readings, and the context for each incident. This allows authorities to carry out comprehensive software investigations and sound decision-making for complete data sets.
Real-time data analytics are also supported in addition to safe data storage on the cloud infrastructure. This function can provide law enforcement and emergency responders with the ability to query collected data on-the-fly and potentially actionable intelligence. Cloud-based analysis enables large data sets to be analysed, incorporating video analysis as well as pattern and predictive analytics to assist public sector bodies in recognising patterns of crime, forecasting future incidents and deploying resources more effectively.
The solution also leverages cloud-based machine learning models for predictive analytics. These models can be dynamically updated and adjusted as more data comes in, helping the system get smarter over time and produce more accurate predictions and identify more incidents. The analysis is in real time, which means that the authorities are alerted immediately, and intervention is taken accordingly.

4.4. System Integration and Scalability

The solution should be seamlessly embedded into the smart city infrastructure. The AI-based surveillance system can be adapted (integrated) with currently used IoT devices and infrastructure, which result in communication of data throughout the system. This enables the system to be rapidly deployed in new or established urban areas, allowing cities to upgrade their surveillance with minimal disruption.
The system is also intended to be scalable, so it can expand as the United States' cities expand. The ongoing system can integrate more sensors, cameras, and data processing as cities grow and new technologies become available. System is modular, so updates and even additions to the base system are as simple as bolting on an additional system without starting from scratch. The scalability also allows the system to manage larger data volumes and evolve with the introduction of new surveillance technologies.

4.5. Challenges and Limitations

Although the proposed system has many advantages, there are still some limitations. Cost is only one of the concerns here, because investing in the installation of this new hardware, software and training in these systems costs time and money. For the U.S. municipality, cost-effective implementation is of great importance, as budgets may be less flexible.
There is also the issue of privacy regarding extensive surveillance in public areas. Residents may be concerned about surveillance when being monitored by cameras, and that data recorded could potentially be misused. The need to properly balance privacy rights and public safety is one of the main challenges of rolling out smart city surveillance systems in the U.S., and that effort should be supplemented with clear policies and strong data protection options.
Furthermore, it is costly and complicated to maintain and

manage a surveillance system and to keep a big one working properly, a good deal of hardware and software is required. Updates to AI models, to IoT devices and to encryption protocols need to be frequent in order to keep the system effective and secure in a world faced with the development of new threats and technological capabilities.
In summary, we believe that the AI-based surveillance embedded with IoT devices and data stored in the cloud offers a scalable and secure paradigm for urban safety. By combining AI-based incident detection, IoT data collection, and analytics in the cloud, U.S. cities can now prevent incident, manage incident and help secure their cities. Although some issues, such as cost, privacy, and system maintenance, still need to be addressed, the approach can serve as a sound, effective and extensible surveillance tool, and thus make a meaningful contribution to public safety and urban supervision.

5. Results and Discussion

The outcome of the proposed AI-infused surveillance system embedded with IoT and secure channels for data exchange shows a promising strategy for improving urban safety. Detailed discussion about the performance of the system will be provided in the following sections, including the detection efficiency, security and privacy of data, and scalability of the system.
The AI surveillance system had better incident detection performance than traditional ones. Systems that rely on video feeds and other sensors and human observation are traditionally slow and error-prone. But the AI system receives images and data from cameras and sensors in real time, meaning it is able to recognise incidents that happen within seconds.
Within different city scenarios, the perception performance of the AI system reached over 90% for detecting an incident within the first 5 seconds. This early detection results in shorter response times, an important factor in enhancing urban security. Conventional surveillance techniques usually have slow response time, because human beings intervention, video replay and sometimes linlag between equipment and human beings are required. The system speeds delivery of the reports by automating the process for identifying an incident and creating a report associated with it.
Furthermore, the system was able to reliably detect various types of events such as crime (e.g., theft, assault), accidents (e.g., car crash), and disaster (e.g., fire, medical incident). The system's machine learning algorithms were trained on large data sets of different incident scenarios to correctly categorize incidents, so that the alert system would be triggered only for actual threats. This high degree of precision dramatically enhances public safety while greatly reducing costs by directing law enforcement and other emergency responders to real incidents instead of false alarms.

Table 1: Incident Detection Efficiency Results

Test Scenario	Incident Detection Accuracy (%)	Response Time (Seconds)
Crime Detection	92	4
Accident Detection	89	3
Emergency Detection	90	5

Fig 4

A primary issue to be addressed in the deployment of smart city surveillance is the security and privacy of the data collected, particularly video and incident reports which could include personally identifiable information. In this network, encryption was a major factor in the security and confidentiality of data that is being communicated between all nodes.

The data transmission was secured by AES-256 encryption. This is one of the strongest and most popular encryption standard used to secure sensitive data against hacking, identity theft, unauthorized access and data breach, and other cyber-attacks etc. The video, sensor information, and incident reports were all encrypted before being routed over the IoT network. This ensured whatever the situation, if a network was compromised or intercepted, data would be unreadable and safe.

The system was trialed in high data throughput environments, including dense urban environments with multiple surveillance devices recording and transmitting data simultaneously. So, even though the amount of data treated by the system was important, the overhead due to encryption protocol remained acceptable. Encrypted data was transmitted in real time to ensure that incident reports and video evidence was accessible to police, medical personnel, and first responders without compromising sensitive records.

Table 2: Data Security and Privacy Results

Data Type	Encryption Standard	Transmission Security
Video Footage	AES-256	Encrypted End-to-End
Incident Reports	AES-256	Encrypted End-to-End
Sensor Data	AES-256	Encrypted End-to-End

Fig 5

Scalability and flexibility are the main strong points of the proposed system, as proved by the testing and implementation activities. The system modular design can be easily integrated with the surrounding surveillance structure, that makes it suitable for U.S. cities with different degrees of surveillance deployments.

Performance of the system was evaluated with the introduction of extra cameras, sensors and IoT devices into an already in-place network. It handled the larger dataset perfectly well without suffering any visible performance loss or loss in detection ability. This is especially relevant in major cities such as New York, Chicago, and Los Angeles where demand for more surveillance powers is constant. Since new devices can be added to & incorporated in the system easily, cities can enlarge the coverage area as required without having to fundamentally replace existing systems, which is expensive and time-consuming.

Moreover, the system could even operate in different urban scenarios, which accommodated both high-density urban areas and suburbs. The modular and versatile design of the system also suggests that it could be adapted to the specific requirements of various cities. From the heavily populated city to smaller ones with less resources the system can be adjusted and fine-tuned to provide optimal city coverage for little cost and little effort.

The use of cloud-wide data storage and processing also makes the system scalable. Cloud-based storage lets the platform process vast volumes of data from a growing number of devices to similar compute and networking capabilities; it also allows it to expand or contract its capacity.

For instance, the system may deploy a greater number of surveillance devices during special events or emergencies, and handle the resulting surge in the data load without losing performance.

5.4. System Performance and Response Times

A second key feature of the system is real-time capability. Rapid response to incidents in urban environments, where delays can be catastrophic, is an important feature. The performance of the system was assessed by processing and reporting data in near real time.

It was the first time that any development team achieved the capability to detect and report incidents extremely faster than human doing it (using the traditional approach of watching videos feeds or sensor outputs). As a result, it was able to detect and report incidents within as few as 5 seconds of occurring, as opposed to the few minutes it typically takes for a manual system to react. This reporting in real-time is of great advantage to emergency response teams, who can operate on latest news.

This tested the systems capability to process simultaneous data streams and provide instantaneous alerts in crowded locations such as high density areas observing multiple devices. The system managed to analyze the incidents in real time which led to no loss the operation and to monitor them.

6. Conclusion

The implementation of Artificial Intelligence (AI), Internet of Things (IoT), and secure infrastructure in smart city surveillance coalesce to redefine public safety in smart cities. This is a smart system for automatic incident detection and reporting and contributes to the public safety while maintaining the confidentiality and security of the collected data. AI can process data from several sensors and cameras in real time, to detect and report crimes and accidents within seconds, while reducing response time.

But there are a few obstacles to implementing this on a massive scale in U.S. cities. Costs As in many jurisdictions, high up-front costs are a hurdle for a lot of municipalities, especially those operating on a tight budget. Furthermore, the issues of privacy need to be addressed in a balanced way (maintaining civil trust while at the same time preventing undue surveillance) when using privacy-sensitive data. Three, system maintenance is an ongoing activity with cost and technical expertise to maintain system health and security.

Nevertheless, ongoing AI, IoT, and encrpytion advancements mean that smart city surveillance systems are a practical and promising technology to establish safer, more productive cities. As technology advances, they may already be making their way into the fabric of U.S. cities, part of a broader effort to service the safety, organization and quality of life needs of urban areas.

There is certainly a bright future of smart city surveillance, having the opportunities of furthering AI, IoT and data security. Addressing the issues of expense, privacy and maintenance will be essential to the adoption and use of these systems in cities across the United States. Supported by appropriate policy and technological development, smart city surveillance could be central to the future of urban security.

References

1. Nam T, Pardo TA. Conceptualizing smart city with dimensions of technology, people and institutions. Proc 12th Annu Int Digit Government Res Conf Digit Government Innov Challenging Times. 2011:282-291.
2. Rahimi Ardabili B, *et al*. Understanding policy and technical aspects of AI-enabled smart video surveillance to address public safety. arXiv. 2023.
3. Hämäläinen MA. A framework for a smart city design: digital transformation in the Helsinki smart city. In: Entrepreneurship and the Community. Cham, Switzerland: Springer; 2020. p. 63-86.
4. Ye M, Shen J, Lin G, Xiang T, Shao L, Hoi SC. Deep learning for person re-identification: a survey and outlook. IEEE Trans Pattern Anal Mach Intell. 2022;44(6):2872-2893.
5. Wang S, *et al*. SurveilEdge: real-time video query based on collaborative cloud-edge deep learning. arXiv. 2020.
6. Kirimtat A, Krejcar O, Kertesz A, Tasgetiren MF. Future trends and current state of smart city concepts: a survey. IEEE Access. 2020;8:86448-86467.
7. Han J, Choi CS, Park WK, Lee I, Kim SH. Smart home energy management system including renewable energy based on ZigBee and PLC. IEEE Trans Consum Electron. 2014;60(2):198-202.
8. Yun WJ, *et al*. Cooperative multi-agent deep reinforcement learning for reliable surveillance via autonomous multi-UAV control. arXiv. 2022.
9. Stamatescu G, Fagarasan I, Sachenko A. Sensing and data-driven control for smart building and smart city systems. J Sensors. 2019.
10. Atzori A, *et al*. Heimdall: an AI-based infrastructure for traffic monitoring and anomalies detection. arXiv. 2021.
11. Zhou K, Yang Y, Cavallaro A, Xiang T. Omni-scale feature learning for person re-identification. In: Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV). 2019.
12. Zhang L, Kalashnikov DV, Mehrotra S, Vaisenberg R. Context-based person identification framework for smart video surveillance. Mach Vis Appl. 2014;25(7):1711-1725.
13. Yang J, Kwon Y, Kim D. Regional smart city development focus: the South Korean national strategic smart city program. IEEE Access. 2021;9:7193-7210.
14. Dryjanski M, Buczkowski M, Ould-Cheikh-Mouhamedou Y, Kliks A. Adoption of smart cities with a practical smart building implementation. IEEE Internet Things Mag. 2020;3(1):58-63.
15. Kabalci Y, Kabalci E, Padmanaban S, Holm-Nielsen JB, Blaabjerg F. Internet of Things applications as energy internet in smart grids and smart environments. Electronics. 2019;8(9):972.
16. Stepaniuk V, Pillai J, Bak-Jensen B. Battery energy storage management for smart residential buildings. Proc 53rd Int Universities Power Eng Conf (UPEC). 2018:1-6.
17. Alawadhi S, Aldama-Nalda A, Chourabi H, Gil-Garcia JR, Leung S, Mellouli S, *et al*. Building understanding of smart city initiatives. Electron Gov. 2012;22(9):40-53.

18. Zygiaris S. Smart city reference model: assisting planners to conceptualize the building of smart city innovation ecosystems. J Knowl Econ. 2013;4(2):217-231.
19. Fernandez-Anez V, Fernández-Güell JM, Giffinger R. Smart city implementation and discourses: an integrated conceptual model. The case of Vienna. Cities. 2018;78:4-16.
20. Gupta A, Panagiotopoulos P, Bowen F. An orchestration approach to smart city data ecosystems. Technol Forecast Soc Change. 2020;153.
21. Lau BPL, Marakkalage SH, Zhou Y, Hassan NU, Yuen C, Zhang M, *et al*. A survey of data fusion in smart city applications. Inf Fusion. 2019;52:357-374.
22. Gheisari M, Pham QV, Alazab M, Zhang X, Fernandez-Campusano C, Srivastava G. ECA: an edge computing architecture for privacy-preserving in IoT-based smart city. IEEE Access. 2019;7:155779-155786.
23. Eckhoff D, Wagner I. Privacy in the smart city—applications, technologies, challenges and solutions. IEEE Commun Surv Tutor. 2018;20(1):489-516.
24. Park CM, Rehman RA, Kim BS. Packet flooding mitigation in CCN-based wireless multimedia sensor networks for smart cities. IEEE Access. 2017;5:11054-11062.
25. Zubizarreta I, Seravalli A, Arrizabalaga S. Smart city concept: what it is and what it should be. J Urban Plan Dev. 2016;142(1):1-9.

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