Role of Artificial Intelligence, Cloud and Internet of Things to Become Smart City Secure and Safe- a Review

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Abstract- **As we know urbanization continues to enlarge due to world population. According to recent research, a population is estimated to double by 2050 and with over 60% of people preferring cities for living in search of better opportunities. Keeping up with the technology advancements have become the way forward. With this objective, to raising the quality of life the solution to problems in cities need to be smart to form a smart city. The smart solution created a smart city. However, our prime goal is to generate safety and security in such cities in the future. In this paper we investigate Role of Artificial Intelligence, Cloud and Internet of Things to become smart city secure and safe.**
Keywords- **Artificial Intelligence, Cloud, Internet of Things ,Smart City, Secure City and Safe City.**

I. INTRODUCTION

A. Smart City

As in everything, progress and adaptation require change, many existing urban infrastructures are outdated or simply can't keep up to speed with the advancements in technology and human needs. According to Caragliu, the city becomes smart, when investments in human and social capital and traditional and modern Information and Communication Technology (ICT) fuel sustainable economic growth and a high quality of life, with a wise management of natural resources, through participatory governance. [1]. Mohanty considers Smart City as a place where traditional networks and services are made more flexible, efficient, and sustainable with the use of information, digital and telecommunication technologies, to improve its operations for the benefit of its inhabitants. Smart cities are greener, safer, faster and friendlier [2]. Based on those and more varied sources, we formed our own characteristics of Smart City, to set a base ground for our further research. For us, the Smart City by the integration of technology and natural environment increases the effectiveness of processes in every field of its functioning, in order to achieve sustainable development, safety and health of inhabitants with the aim for increasing the quality of life of citizens, near community and environment [3]. Smart cities also include a clean and sustainable environment and application of a smart solution, the focus begins sustainable and inclusive development. With the ability to harness technology leading to a smart solution.

B. Artificial Intelligence

The term AI was coined in 1979, by John McCarthy, can be defined as the "the science and engineering of making intelligent machine"[4].Artificial Intelligence (AI) is the intelligence of machines and the branch of computer science that aims to create it. AI is study of how to make computers do things which at a moment, people do better. Artificial Intelligence aims to improve machine behavior in tackling such complex tasks. The importance of artificial intelligence is the ability to create a never-ending thought process and collective that could solve our problems. Accomplishing this by thinking of every possible solution. The study into the development of artificial intelligence has long been hindered because of disinterest show by governments and capitalists alike. Despite the many challenges, there have been significant creation in the field like-

- Fraud detection system
- Advanced sensing system
- Drug detection
- Advanced computing and human computer
- Advanced speech recognition software [4].

AI is what makes a smart city. Due to its vast applications, AI has filtered into many general purpose uses. speech and pattern recognition in smart devices have become an everyday use. In today's digital age, every person generates may be terabytes of digital information. As Donald Power notes in one of his articles "Will Smart Cities need AI to flourish? [5].

C. Internet of things

The term Internet of Things was first coined by Kevin Ashton in 1999 in the context of supply chain management [6]. However, in the past decade, the definition has been much more inclusive covering a wide range of applications like health care, utilities, transport, etc. [7]. Although the definition

of 'Things' has changed as technology evolved, the main goal of making a computer sense information without the aid of human intervention remains the same. A radical evolution of the current Internet into a Network of interconnected objects that not only harvests information from the environment (sensing) and interacts with the physical world (actuation/command/control) but also uses existing Internet standards to provide services for information transfer, analytics, applications and communications. [8]

D. Cloud(cloud computing or storage)

Cloud computing is a recently evolved computing terminology or metaphor based on utility and consumption of computing resources. Clouds could be classified as public, private or hybrid. Cloud computing relies on sharing of resources to achieve coherence and economies of scale, similar to a utility (like the electricity grid) over a network [9]. This term(cloud computing) coined in the year 1950 and start rapid growth in the late 1990's. Generally, in business, the term "moving to the cloud" also refers to an organization moving away from a classical CAPEX model (buy the dedicated hardware and depreciate it over a period of time) to the modern OPEX model (use a shared cloud infrastructure and pay as one uses it). By this, the profit of the company increases. Cloud computing provides the facility to access shared resources and common infrastructure, offering services on demand over the network to perform operations that meet changing business needs. SaaS is a model of software deployment system where an application is hosted as a service provided to consumers across the Internet. Saas is generally used to refer to business software rather than consumer software, which falls under Web 2.0. [10].

II. BINDING THE CONCEPTS TO MAKE A SMART CITY

From the Figure1, Our thoughts on Smart City influenced mainly by the work of Mohanty and Center of Regional Science in Vienna include these systems [11, 12]:

Smart Transport,

- Smart Energy,
- Smart Technology,
- Smart Living,
- Smart Environment,
- Smart Citizens and Education,
- Smart Economy,
- Smart Government,
- Safe City.

Specific case is the position of Internet of Things and Cloud. Those are not independent systems, but rather basic tools to achieve described needs.
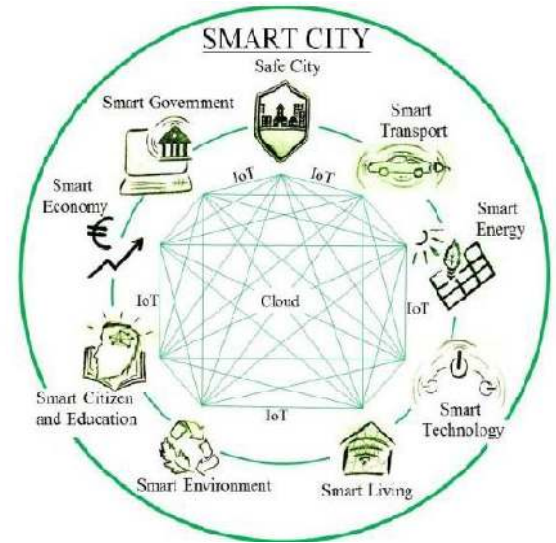

Figure1 :Smart City

III. SAFETY AND SECURITY USING AI, IOT AND CLOUD

Safe Cities as an important part of Smart Cities, the safety is a crucial component of life quality in every city. Therefore we can say that every Smart City must be a Safe City as well. Safe Cities are characterized by

3.1 Gunshot detecting sensor

The first phase was aimed at the urban crime prevention approach, mainly in three fields: institutional crime and violence prevention, social crime prevention, and the physical environment. A survey observed that the city was suffering from an intense problem of gun violence. Curb this violence often resulted in casualties as the officers had incomplete knowledge about where the gunfire was taking place, how many shots were fired, are they still being fired etc. However, after the introduction of Shotspotter, a gunfire detection system, the police authorities were able to combat this with proper resources and bring down the homicide rate to an all-time low. Internet of Thing(IoT) is used to listen for sound signals in an event. Shotspotter uses a spatial filter technique. collect all required data from the cloud and Artificial technology is used to teach the system by using collected data and technique to identify gunfire event in high-noise environments.

3.2 Video Surveillance and Analytics

Earlier security system, security personnel were needed to analyze vast amounts of surveillance data to pick out patterns of human behavior identified with potential harmful threats. however, with the increase in the amount of data generated, such a method was no longer viable. Equipping the cameras with visual intelligence(called video analytics) help bridge the gap between the data pouring in form various sources and personal viewing, analyzing, and acting on the information extracted from the data. one such system is AISight, a behavioral analytic software, with automated awareness of suspicious, out of normal behavior. With AISight's intelligent video analytics, no longer have to have a programmer write rules to determine normal from abnormal. This solution uses Artificial Intelligence to learn what normal behavior is during its initial learning phase and once it automatically captures people, employees, vehicles acting normally, it will be able to recognize abnormal behavior. This unique self-learning solution can automatically detect, analyze and make decisions to alert you of actionable events from hundreds (even thousands) of cameras 24 hours a day, 7 days a week without ever getting tired.

3.3 Drones

Unmanned aerial vehicles, or drones ,have to be the most innovative invention considering to be applied in smart cities.

Advantages of Drones-

- Being unmanned, drones do not require personal dedicated to them and can be used for long-term surveillance.
- The can cover large areas.
- They can collect varied types of data.

These drones are now being utilized for a variety of reasons, including

Traffic Monitoring: - drones are a more efficient and cost effective method of monitoring road and traffic.

Crow Control: - crowd monitoring, predicting their path and progress and identification of hot sport of trouble can be efficiently achieved using drones.

Civil Surveillance: - smart drones are fast emerging as popular option for civil surveillances.

China DJI , the largest drone maker, recently developed the Phantom 4,a smart drone. It can not only identify suspicious anomalies, but also follow them by its own.

IV. CYBER SECURITY

All system that using Internet of Thing (IOT) to deliver what is required of them heavily rely on the data they collect from the real world. This data is utilized not only for real time application, but more importantly ,to improve the functionality of the systems. Hence the protecting the data is of prime importance. Artificial Intelligence (AI)becomes the solution to this problem. With the number of cyber threats growing day by day, AI can be utilized to analyze oceans of data with efficiency, accuracy and speed. With the ability to learn from already tackled threads, the system can identify new thread, even if their patterns changes. already tackled threads, the system can identify new thread, even if their patterns changes. The Antigen a technology, to be released by the end of this year, aims to do just that, replicating the function of human antibodies and neutralizing threats without human intervention. This is possible through Internet of Thing (IoT) is a source of collecting data, the cloud is utilizing to store data and artificial intelligence is used for analyzing data.

V. CONCLUSION

A Smart City has become safe and secure is a very broad task. We cleared out what it means for us and what systems should include for safe and secure Smart City. A machine led system, that collecting and storing data and understands only logic and patterns is a double-edged sword. As dependence on technology (Internet of Thing, Cloud, Artificial Intelligence) increases, smart cities have become smarter and safer.

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