

# THE ROLE OF ARTIFICIAL INTELLIGENCE IN THE FIELD OF BUILDING SMART CITIES.

## 1 MOHAMMED SABIL

Master of Computer Applications, Scholar,  
U.B.D.T College of Engineering, Davangere,  
Karnataka, India.

## 2 CHETAN KUMAR G.S

Assistant Professor, U.B.D.T College of  
Engineering, Davangere, Karnataka, India.

### Abstract:

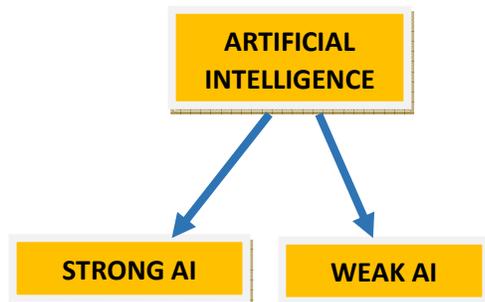
This paper will provides the reviews and the meaning of Artificial Intelligence and its various advantages in the field of Building Smart Cities. It also provides the current technologies that help in resolving the real world problems and discusses the applications of AI in the field of Industries, Traffic control, weather forecasting, street lights, water supply, and etc. This paper also concludes with the fact, that is potential for the future enhancements of emerging technologies.

**Keywords — Smart Cities, Traffic control, Expert Systems, weather forecasting.**

## I. INTRODUCTION

**A**RTIFICIAL INTELLIGENCE (AI), can be represented as an intelligence that exhibited by an artificial entity which perceives its surroundings and takes the actions that reduces the human intervention and maximizes the overall chances of achieving its goal successfully. There are many definitions that can be suitable for Artificial Intelligence (AI), at different fields. Basically intelligence is a computational part of ability, to judge on something and achieve the goal in real world. In other words, it is an ability to think or analyze the current or future situations with the help of current data and as well as stored data by understanding, recognizing patterns, by adapting to change with learning from experience. Literally Artificial Intelligence (AI) is mainly concerned with making systems behave like human beings more like taking decision in less time, than a human takes. Therefore it is called Artificial Intelligence. This can be further classified into two parts according to their functionalities.

- Strong AI
- Weak AI



**S**TRONG AI: The strong AI's principle is completely based on the machines in which, the machines could be made to act or think like a

human beings. In other words, a strong AI's can represent as human minds in the future. So there is a possibility that a strong AI can completely withdraw the human interventions in almost all fields. And it also claims that, it will be completely surrounded by such kinds of systems which can completely process like human beings! and a machine may have the thinking and judging capacity as a human beings. If that is the case, then it's not far away, we are surrounded by the machines that would resembles like human beings. There is possibility that, these machines will have the ability to think, to reason, and to judge in some critical conditions where a human is not capable of doing such jobs. Many technologies are involved together to build such a Strong AI systems to resolve the real world problems without the intervention of human beings. Providing a life to the Strong AI is same as the inventions of some sort of well defined technologies. Many research people claims that they've adopted the Strong AI in their machines which is true at certain levels such as, in pattern matching, reasoning, but these machines failed to do the job where a toddler can do it easily. Many debates and researches are still going to achieve this milestone in the field of Artificial Intelligence.

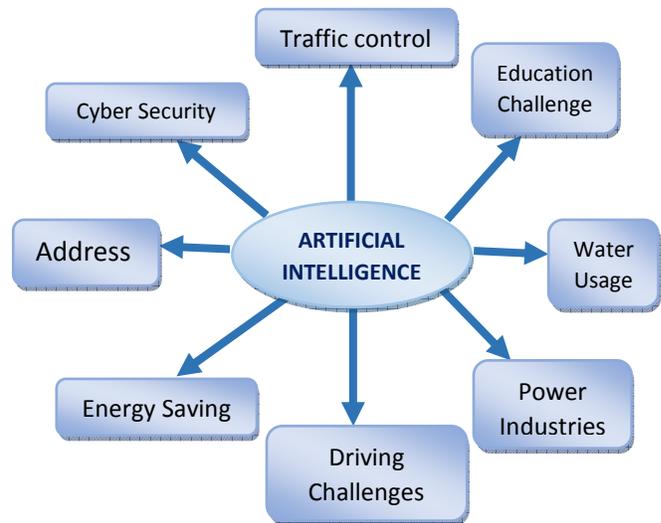
**WEAK AI:** The principle behind Weak is simply the fact that the systems or the machines are made in such a way that, it can act as if they are clever enough to take the decisions. Basically Weak AI resembles a sort of thinking capabilities of human beings. Well defined instructions are already fed up into the machines by which a Weak AI can judge the next move according to the stored instructions. Sometimes the Weak AI is also called as narrow AI which is intended on one narrow task. There are many examples which resemble the Weak AI. Apple Incorporation Limited's "Siri" is a good example of narrow intelligence. Siri can operate within a limited pre-defined circumstances, where there is no pure intelligence, no consciousness, no life despite of being a sophisticated example of weak AI. In Forbes (2011) magazine, Ted Greenwald stated that "The iPhone/Siri marriage represents the arrival of hybrid AI, combining several narrow AI techniques plus access to massive data in the cloud." Many other companies are inheriting the Weak AI's in their projects to have better interventions with its customers. Amazon's Alexa, Tele communications voice interaction systems and now, the world's largest software vending company Windows is also lined up by introducing Cortana in their operating systems. Another AI researcher Ben Goertzel, on his blog in 2010, stated that "Siri was "VERY narrow and brittle" evidenced by annoying results if you ask questions outside the limits of the application ". By this we can conclude the weak AI that, it can only perform the task that is within its limits not on the outside boundary. Some other AI researchers think that weak AI could be dangerous.

In other words the Artificial Intelligence (AI) is the strength of a system to perform some tasks, which would otherwise be only expected by the human beings. These tasks include the capacity for knowledge and the ability to acquire it. This also comprises the ability to analyze, understand, and judge the situation. Last but not least, to provide the correct result of given thoughts.

There are many advantages associated with the Artificial Intelligence (AI), among which, one of the major advantage is its decision making scenario which is completely based on the facts! rather than the emotions. It is very appreciable that emotions sometimes have inward effects on making some decisions in real world but, that's not the case in AI. And there are still many advantages as well as disadvantages of AI, but now we just focus on the

advantages that can lead to build the smart cities in smarter way.

## II. SMART CITY CHALLENGES THAT COULD BE SOLVED BY ARTIFICIAL INTELLIGENCE



**Fig 2: Challenges that can be solved using Artificial Intelligence.**

**T**raffic Control: As we all know that, the biggest problem the cities are facing nowadays is traffic. Many strategies and many plans had been made to overcome with the problem of traffic. A study has found that the problem with the traffic usually occurs due to the improper lanes and no proper routes to get rid from. So the Artificial Intelligence plays a dominant role in controlling the traffic. If proper AI systems are implemented at the traffic signals which judge the flow rate at particular lane and provide the signals to the drivers to use alternative lane which takes few extra minute which is better! Rather than standing for hours. It is also true that traffic usually occurs when there are no proper drivers in the cars, which sometimes leads to the accidents too. At international level, the estimates of deaths and injuries on road reach millions each year. A reason is always a human error. This human fault can be completely withdrawn by replacing the traditional vehicles with self driving vehicles. The analysis report developed by Stanford University confirms that the self-driving cars can efficiently

decrease the number of traffic-related problems and as well the accidents. The driverless cars with AI can judge the overall environment across the car and judge the speed and exceed according to the free lane available. Which is other side provides the safe ride as well as reduces the traffic problems. In this processing Google has developed its autonomous cars and deployed them on the roads too. These cars had run through thousands of miles with very few accidental records. These cars can handle the uncertain situations by just stopping.

**E**lectrical Energy saving: The smart city should efficiently utilize the electrical energy, so that the energy can be available 24/7. This is one of the biggest challenges to drag in a proper way. The most electrical energy wasted in big cities is due to improper maintenance of street lights. There are many things that can be utilized to reduce the consumption of electrical energy by using LED lightings across the cities including in buildings too. But still a proper AI system can analyze the energy efficiencies and judge the areas where the lights are necessary. With the help of sensors an AI system can automatically turns off the lights on sunrise and turns on automatically after sunset. This job is always not done properly at many places by the humans. So to have a better utilization of these energies Artificial Intelligence systems can be imported at some stations which would look after each areas of smart cities and reduces the wastage of electrical energies. More efficiently dimmable street lights can also be used with the help of AI's which dims the lights according to the natural light available. There are many Summits are ongoing to make the proper utilization of Smart lightning at smart cities.

**C**yber Security: The smart city concept is gaining attraction at a faster pace than expected. And it is true that every nation around the globe is preparing to build their digital cities of tomorrow. As it's a fact that "Greater power comes with greater responsibilities", it is the responsibility to have greater cyber security. In this processing Artificial Intelligence plays a very significant role. As we know that, weak AI is completely works on the fed up instructions! So, same thing is done by making some advanced changes in providing cyber securities. Whenever we consider smart cities it basically consists of Internet of Things (IoT), surveillance systems, and data capturing. AI machines are made in such a way that they can easily track the overall things that are happening on Internet which is basically very hard for a human being to watch and keep track of each

and everything! Cyber bullying also became one of the problems now days. Many web applications are made in such a way that they can automatically remove the words that are consider being very bad. Artificial Intelligence is made to keep track on the abnormal activities in a particular system. Many Governmental sectors neglect the cyber securities just to keep a deserving candidate for the work. But Artificial Intelligence does not require any human intervention, it just required some proper instruction then the rest can be left on the AI's.

**E**ducational challenges: AI can solve the educational challenges too. The Georgia Tech University in U.S revealed that one of the main reasons behind students quitting their education from the halfway is the lack of support. It is true that nowadays the classes have become smart with interactive learning and reasoning concept, but still there is lack where many students are not getting what they are intended to have. So to deal with this challenge, AI's teaching assistant in the form of robot can solve the problem. The AI's robot can able to answer the students with 97% accuracy. And students are many more excited to be with their new digital teacher.



On the other side, it's important to keep in mind that every student has its own way of learning and understanding concepts at different speed- among which some are quick graspers and some are slow learners. So to overcome this challenge AI's can achieve making students smarter and more Clever. And AI can also prove to be a smart teacher and solve all learning problems of students through its extensive knowledge in every subject. So to conclude, with the help of AI in an Education system, smart cities would have to rethink our entire education system and possibly build a convenient infrastructure that meets the ongoing demands. Besides, a fully automated teacher for one-to-one

sessions is quite an expensive idea for every individual.

**P**ower Industries: Power Industries leads a well defined role in making the smart cities, where the whole job is preferably depends on how you utilize the power in a smart city. Almost all the industries uses the power but! Utilizing the power in a convenient way is still faraway. So to add further the power at these industries should be utilized in such a way that it can be saved for the future. Many countries are using AI's in their industries to make use the power more conveniently and efficiently. So the AI's can also help in saving the power in the industries which can make a smart city more energy saving. AI powered tools can be great help! In near future it can prove to be a whole game-changer in how we produce the power, supply and consume energy resources. In fact, smart cities are already implanting AI. The giant company like Google has a huge data centers with servers operating 24/7. These servers require a massive amount of power to process and remain at a cool temperature without getting heated up. So to solve this problem Google uses its recently developed artificial intelligence platform called "DeepMind". This platform curbs down unnecessary energy use by analyzing when the cooling system needs to be activated. With this AI has been beneficial to Google in saving about 40% of its energy costs at its server centers. So to add further as DeepMind AI system, if smart cities also inherit this then it can even save more power and can save many Rupees.

**W**ater Saving: Utilization of water smarter way is one of the initiatives of smart city. Many strategies are made to save the water and utilize it in a proper way. Implementation of AI would reduce the burden in saving water. AI can made to predict the water level in different areas where there is very less availability and can help in providing the water conveniently. If there is any scarcity of water! that is about to take place within a couple of months then, AI can predict the level of scarcity and help overcoming the problem.



**Fig 3: Annual water Requirement per person** AI expert systems would provide the authorities with advice and consultation on the optimal decisions to reduce costs and ration consumption. Moreover, the hardware infrastructure of facilities could be interconnected via trendy "Zigbee" complaint devices. These are most cost effective for AI implementation. These devices and send and receive operating information from a centralized automated unit. Intelligent computer systems can able to make decisions completely based on real time data, without the interference of humans, and result in the optimal rationed consumptions of water resources. So to add further, AI systems can provide the figures of waters that are available in a particular resource and can predict how long that water may lasts.

### III. CONCLUSION

All these ideas might sound theoretical or futuristic but many cities like Amsterdam, Tokyo, are already implemented the AI's in their initiatives. Innovative technology is therefore poised to make our cities smarter and more resilient to the challenges smart cities face. Complemented by partnerships between public and private sector entities, there are increasing opportunities to bridge more gaps and allow young start-ups to introduce novel solutions. Technology holds immense promise in helping humanity to find efficient ways to manage water, electricity, controlling traffic, Expert systems, Weather forecasting. Software offering insights into ways we address Power, water, and electricity challenges could empower us to make better decisions for the future of our planet.

### REFERENCES

- [1] Ted Greenwald, “At the impact zone between technology and opportunity”, In Forbes (2011) magazine.
- [2] Ben Goertzel, “Practical Philosophy for the Post human Age”, A Cosmist Manifesto (2010).
- [3] SmartCityExpress, “What Kind of Smart City Challenges Could be Solved by Artificial Intelligence” December 11, 2017.
- [4] Qamaruddin, “Artificial Intelligence, Smart Cities & Intelligent Water in MENA”, October 24, 2017.
- [5] Nils J Nilsson American Association for Artificial Intelligence" AI magazine 2005.
- [6] George F Ludger “Artificial Intelligence - Structures and strategies for complex problem solving” 5th Edition, Pearson, 2009.
- [7] Girish Kumar jha, "Artificial Neural Networks and its applications" international journal of computer science and issues 2005.
- [8] io9.com mentions narrow AI. Published 1 April 2013, retrieved 16 February 2014.