

The Vision of Smart City: A Review

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Abstract— The vision of “Smart Cities” is the urban center of the future, made safe, secure environmentally green and efficient because all structures - whether for power, water, transportation, etc. The research and engineering challenges along the way to this vision encompass many technical fields including physics, chemistry, biology, mathematics, computing science, systems, mechanical, electronics and civil engineering.

Key words: Smart City, water, physics, chemistry

I. INTRODUCTION

A smart city is the same as a digital city, and sometimes its meaning is close to that of a sustainable city. It is a challenging term, because who wants his contribution to the development not to be called smart. While most human activities take place in cities, almost anything can be included within the smart city concept.



Fig. 1: Smart City Concept

A including roads, bridges, tunnels, rail/subways, airports, seaports, communications, water, power, even major buildings, can better optimize its resources, plan its preventive maintenance activities, and monitor security aspects while maximizing services to its citizens.

All around the world, urbanization is a growing trend. As more and more people get together, smart systems and their integration need to be developed, not only to provide the services that people need but also to do so efficiently with minimum impact on the environment.

II. THE ROLE OF TECHNOLOGY



Fig. 2: The Role of Technology

Advances in new technology are employed to improve city applications and services. There are communications, analytical and control technologies that permit transforming the way of doing things while influencing better policy and urban management. It is changing the entire way the service can be solved, combining the ICTs with city infrastructure and shifting the city systems solutions. Thanks to these technologies, there is the capability in the provision of services via digital communication, e.g. interactive services or automating the solution of services. Data are stored and forwarded by using the

network backbone in order for use by service providers and in related applications. Highlighted the role of small cell technology in smart cities – there is the prospect of “increased broadband capabilities, improved flexibility and easy deployment of scalable multi-service network architectures.” The article concludes that the integration of broadband personal communications with device-to- device communications and machine-to-machine will constitute a significant challenge.

III. OVERVIEW OF A SMART CITY

There is a wide range of services and applications. These services cover fields such as transportation (intelligent road networks, connected cars and public transport), public utilities (smart electricity, water and gas distribution), education, health and social care, public safety. Emerging applications and services are extended into diverse fields such as everyday life of citizens, disaster management, smart buildings, logistics and intelligent procurement. The applications for this portfolio include implementation for the connected city such as: smart grid, smart home, security, building automation, remote health and wellness monitoring, location aware applications, mobile payments and other machine-to-machine applications.



Fig. 3: Overview of A Smart City

- 1) **Structural Health of Buildings:** Proper maintenance of the historical buildings of a city requires the continuous monitoring of the actual conditions of each building and identification of the areas that are most subject to the impact of external agents. The urban Internet of Things may provide a distributed database of building structural integrity measurements, collected by suitable sensors located in the buildings, such as vibration and deformation sensors to monitor the building stress, atmospheric agent sensors in the surrounding areas to monitor pollution levels, and temperature and humidity sensors to have a complete characterization of the environmental conditions.
- 2) **Waste Management:** Waste management is a primary issue in many modern cities, due to both the cost of the service and the problem of the storage of garbage in landfills. For instance, the use of intelligent waste containers, which detect the level of load and allow for an optimization of the collector trucks route, can reduce the cost of waste collection and improve the quality of recycling.
- 3) **Noise Monitoring:** Noise can be seen as a form of acoustic pollution as much as carbon oxide (CO) is for air. In that sense, the city authorities have already issued specific laws to reduce the amount of noise in the city centre at specific hours. An urban Internet of Things can offer a noise monitoring service to measure the amount of noise produced at any given hour in the places that adopt the service.
- 4) **Traffic Congestion:** On the same line of noise monitoring, a possible Smart City service that can be enabled by urban Internet of Things consists in monitoring the traffic congestion in the city. Even though camera-based traffic monitoring systems are already available and deployed in many cities, low-power widespread communication can provide a denser source of information. Traffic monitoring may be realized by using the sensing capabilities and GPS installed on modern vehicles.
- 5) **City Energy Consumption:** Together with the air quality monitoring service, an urban Internet of Things may provide a service to monitor the energy consumption of the whole city, thus enabling authorities and citizens to get a clear and detailed view of the amount of energy required by the different services (public lighting, transportation, traffic lights, control cameras, heating/cooling of public buildings, and so on). In turn, this will make it possible to identify the main energy consumption sources and to set priorities in order to optimize their behavior
- 6) **Smart Parking:** The smart parking service is based on road sensors and intelligent displays that direct motorists along the best path for parking in the city . The benefits deriving from this service are manifold: faster time to locate a parking slot means fewer CO emission from the car, lesser traffic congestion, and happier citizens.[]
- 7) **Smart Lighting:** In order to support the 20-20-20 directive, the optimization of the street lighting efficiency is an important feature. In particular, this service can optimize the street lamp intensity according to the time of the day, the weather condition, and the presence of people. In order to properly work, such a service needs to include the street lights into the Smart City infrastructure. It is also possible to exploit the increased number of connected spots to provide Wi-Fi connection to citizens. In addition, a fault detection system will be easily realized on top of the street light controllers.

IV. ROLE OF ENGINEERS IN SMART CITY

The research and engineering challenges along the way to this vision encompass many technical fields including physics, chemistry, biology, mathematics, computing science, systems, mechanical, electronics and civil engineering.

Engineers have a key role to play in creating and maintaining sustainable communities across the planet and we have to rise to the challenges we face very quickly. Governments of both developed and developing countries are faced with the demand for more, bigger, smarter and more liveable urban settlements and yet these very same cities, where 50% of the world's population lives (and set to rise dramatically), account for 75% of the carbon footprint of the planet. Knowing what we know today, delivering what we deliver today and using current tools and processes invites disaster. As engineers, we need to adapt our thinking, embrace advocacy and business planning, technology and computer sciences, work across wider domains and ensure that cities are truly able to meet the full needs of our future.

V. THE APPROACH



Fig. 4: Smart Solution

In order to realize this vision, this initiative has been undertaken to build an alliance of universities, government, business associations, the private sector and Brookhaven National Laboratory. The intent is to develop a structure that can link the needs of urban centers to the resources of the academic and laboratory community, thereby efficiently identify technologies in their respective portfolios that can be rolled out through demonstration project to commercialization in cities. When technology does not exist, to then begin an applied research effort to address these needs. The model chosen to begin this initiation is that of the northeast region of the U.S.A. This was based on a simple need analysis that looked at the population density and the age of the regions urban center, starting with New York City. The regional model, described below can then be expanded nationally and internationally.

VI. CONCLUSION

A vision of the city of the future has been presented - one that rests on the integration of science and technology through information systems. A future that will require a re-thinking of the relationships between government, city managers, business, academia and the research community. The title of this vision is Smart Cities.

REFERENCES

- [1] Robert E. hall, "THE MART CITY", paris, september 28, 2000, digital.library.unt.edu.
- [2] Dr. K N Sheth, "Clean Environmental Issues of Smart Cities", presented at GTU on Seminar on Smart Cities – Quo Vadis?, Organized by center for governance system- GTU, Ahmedabad (Aug, 2014) https://www.researchgate.net/publication/316630559_Clean_Environmental_Issues_of_Smart_Cities
- [3] VTT research centre, "SMART CITY RESEARCH HIGHLIGHTS 12", espoo, finland, 2015, www.researchgate.net.
- [4] Prof Dr K N Sheth & Mittal Patel, " Pervious Concrete As Environmentally Friendly Material- A review" International Journal of Engineering Innovation & Scientific Research, May 2015, ISSN 2395 6372 pp 1-6 https://www.researchgate.net/publication/314078418_Pervious_Concrete_as_Environmentally_Friendly_Material_Review
- [5] Radovan novotny, "TELECOMMUNICATION SYSTEM & MANAGEMENT", 2014, www.omicsgroup.org.
- [6] 4.smart cities, "THE NEXT BIG OPPORTUNITY OF ENGINEERS", www.ccimagzines.in
- [7] 5.buro happold, "THE ENGINEER'S ROLE IN THE FUTURE CITY", www.burohappold.com.