SMART CITIES: A VIEW ON HOW TO BRIDGE THE DIGITAL DIVIDE

Sanjana Argula[1], Samhita Argula[1], Gauthami H Gopal[1], Deeksha Argula[2]
[1]Sreenidhi Institute of Technology and Science, Medchal, Telangana
[2]Vignana Bharathi Institute of Technology, Aushapur, Telangana.

Abstract : With significant and concomitant advances in technology today, we have been able to achieve a vast leap into interacting with the environment around us. It is no longer a myth to get involved and communicate with our surroundings, which has been made possible by the revolutions in machine learning, cloud computing and artificial intelligence. From smart appliances to smart cars, developers are reaching as far as smart cities- which will enable the public to dynamically understand and evolve with their urban cities. The Internet of Things (IoT) plays a huge role in making such cities conceivable. The sensing city uses the cloud and intelligent machines to factor in people data, enable smart evolution of daily life and present an easy way to customise the city around you. In this paper, we purport the ways such a city could be brought into existence, how to handle such cities with the right knowledge and assess it as a model for further advancement of intelligent environments. The project is aimed at improving the functions of everyday machines and technological devices alike, to provide a better understanding and ease of usage. It provides an accumulated usage of daily devices to enhance how humans perform chores and go about their daily lives.

IndexTerms **- Internet of Things, Machine Learning.**

I. INTRODUCTION

The Internet of Things (IoT) has made communication and interaction with the devices and technologies around us seemingly innocuous and undemanding. With the sweeping changes in technology, it is only appropriate if our cities also pace with the advancements humans are making in almost every virtual field. [1] One of the goals of a smart city must be to base decisions about design, policy, and technology on information from an extensive network of sensors that gather data on everything from air quality to noise levels to people's activities. The city must be self-learning and should root in a deep understanding of the lives of its residents and their habits. As such a smart city should yearn to fulfill the needs of banal life and show users their graphs, advancements and evolve with each coming day. A smart city will take the help of cloud to store all its user data so it can perform analytics and suggest users different courses in traffic, empty parking spots, whether they have left the lights on at their home, or any basic purposes like that. Going ahead with a smart city, one can have autonomous bus riding services with self-driving vehicles, which will seek to reduce traffic, pollution and road accidents. These will help a great deal in reducing human effort. The main tasks for such evolving and learning cities will be to reduce electrical consumption, enhance interactivity between a user and their surroundings and above all, to assist the users in many basic types of activities and chores. There have been examples of smart city technologies implemented in Singapore [2], Dubai, Barcelona, Amsterdam, Copenhagen, China, New York, etc. Such works only heighten the possibility that moving on from baic offline cities, having an intelligent, evolving city will help inhabitants lead an easier, comfortable life. There are concerns about the privacy of users and user data storage, which requires a major focus from companies or organisations who take up such projects. If these concerns are aptly met with and the residents are satisfied with the arrangements, then there can be an idealistic agreement between both parties. A smart city thus requires such research, including these but not pertaining to, a unique study where geospatial traits (such as air quality) and the patients' health are combined to better understand how patients with COPD and other diseases can be supported to avoid hospitalization.

II. LITERATURE REVIEW

While trying to learn how these various multifaceted cities fare in the countries and continents worldwide, it is brought to attention why such projects in India face a lot of friction. Rumi Aijaz purports that this could be the result of poorly planned city structures [3] and the general tepid governance such a plan of action is likely to receive. The plan for a smart city calls for all vehicles to be autonomous and shared. We can have inhabitants upload data through a vital core system. Robots can be used to roam underground doing menial chores like delivering the mail. Such a smart city can be used to build intelligently evolving machines that can collaborate together to present users with a uniformly associated habit graphs and percentages.

2.1 City level developmental challenges

Urbanisation is a touchy subject because it has many contradicting views. Rapid urbanisation has the potential to improve a society's well-being. Half the world's population is concentrated in cities and they generate more than 80 percent of Global Domestic Product (GDP). With increasing urbanisation and rural folk migration [4], urban areas are expected to house more population. This requires steady development of physical, social and economic infrastructure. [5] In this scenario, a smart city is an attempted solution - to improve living conditions and achieve higher economic growth.

2.2 A smart approach

It is not easy to define what a 'smart city' is, so there is a pending need for clarification and boundary setting. It is desirable today that all the components of city planning and development such as, building core infrastructure, creating employment and improving livelihoods of the citizens, should be done smartly. All such work needs to be done using fewer resources, in an

inclusive manner and applying smart solutions with advanced technology. By adopting a smart approach, existing cities can be successfully transformed into smart cities, improving efficiency of population, and providing a better quality of life to citizens.

There have been few models proposed [6] for the establishment of smart cities. For example, in this report [7] an example model is given for mission statement and guidelines for transformation process of smart cities. A list of adequate qualifications is proposed, which can be used as a guiding example.

The basic infrastructure components which a Smart City could improve:

i. water supply,
ii. electricity supply,
iii. sanitation and waste management,
iv. public transport facilitation,
v. affordable housing,
vi. digitalization,
vii. e-Governance and citizen participation,
viii. safety and security of citizens
ix. health and education
x. societal well-being

2.3 Smart cities : An evaluation

The innovation of creating smart cities has been adopted in many developed nations. In their vision of smart cities, IBM calls a city a "system of systems." [8] Most definitely, to successfully achieve the goals and reap the benefits of smart cities, a lot would be dependent upon the central, state and urban local governments to create suitable conditions. It takes smart people to form smart cities. Education will thus play a vital role in an operational smart city and honing the managerial, technological skills and improving the adaptability of citizens is a must.

Only then will this vision - one that rests on the integration of science and technology through information systems [9] - become a reality. In this open innovation project, [10] they provide us with initial examples of smart city collaboration models with innovative ecosystems, and the sharing and usage of resources such as testing facilities, user groups and experimentation methodologies. Such models and their examples are key to understanding the different aspects of smart development.

2.4 Advantages of a smart city

Smart cities will be beneficial for its inhabitants in their daily chores, in helping them to manage networking activities and also have a positive impact on the environment by reducing energy consumption, greenhouse emissions and helping to build a greener, cleaner world. [11]

Research shows that a new type of government which adapts and evolves with a smart city is needed and desirable. [12] It is highly appreciative if people can have an innate responsibility and accountability towards their locale. Building a smart city can thus impart such governance values, which some call "smart governance" into our political structure, which can only go ahead to make a marked improvement on our current geopolitical situation.

A smart parking will enable us to spend quality time of ours on other important things than worrying about where to rest our vehicles. Smart traffic lights will focus on the road and monitor vehicular and pedestrian traffic to reduce accidents and prevent any sort of road rage or collisions. Smart homes, as we already know, have the decided advantages of automated tech like lights, electric power supplies digitized and habitual data conceptualised from the cloud. Smart street-lights will ensure that even the common public can enjoy the benefits of the smart technology, this will reduce electricity consumption and help in making the world a better place. Smart buses will provide 24/7 vehicular support to people without cars or mopeds for transport. It was even found beneficial because it is able to integrate the functionalities with the physical structure, hence encompassing and overcoming the digital divide for working people as well as citizens [13]. The integration of smart cities into daily lives poses a difficult task, which has different views and different ways to be tackled with around the world. The biggest challenge and hesitation for an organisation to initiate a smart city project lies in the 'digital divide' that persists between those who have access to advanced technology and those who don't. If the inhabitants do not possess required devices to operate the surroundings around them and have no means to interact with their environment, then the point of a smart city falls short

III. DESIGN AND METHODOLOGY

A smart city should thus be able to tackle any problems being faced by its inhabitants and to bridge the digital divide, we need to approach this problem with a step-by-step approach that will empower each and every person in the city. We have found through researching various articles like [14] and [15] that the path to a better, sustainable and sensible smart city ecosystem lies in using intelligent methods of innovative ideas and collaboration discovery. We propose a model to approach such issues in a tiered approach which involves familiarising the public with our core initiatives and training people to be better accustomed to a project's technological aspects.

3.1 An all-encompassing network initiative

If previous initiatives to have a global connecting network, which will spread throughout an intended system and benefit all its users, are any indication, a smart city needs a 24/7 ubiquitous system. This will ensure that people throughout a smart city can have access to the online network regardless of device or location. This can be ensured with strong wi-fi signals everywhere and provide users with unlimited usage of resources.

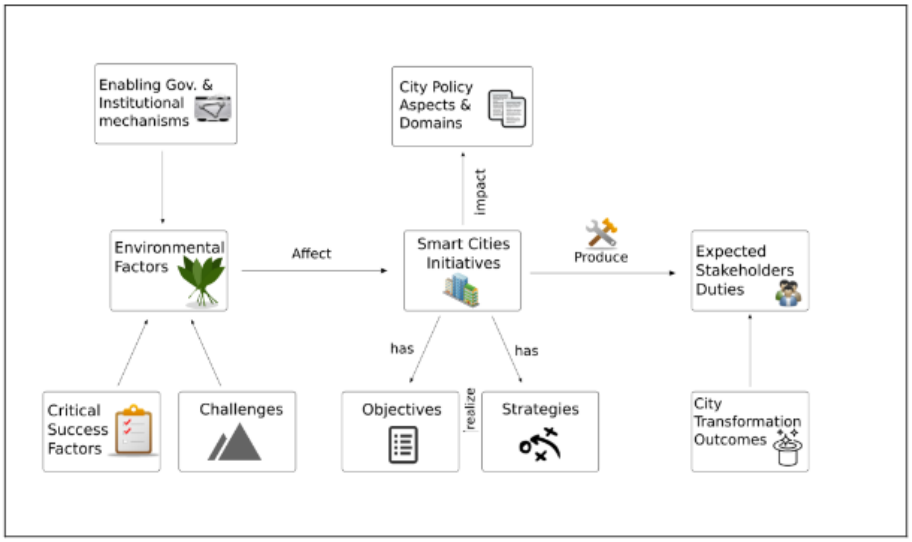

Figure 1: Source: Twenty Second European Conference on Information Systems, Tel Aviv 2014 [16]

The technological advancements are key to what challenges a project this huge will face. When our networks and devices are constantly changing and evolving, it is upto our organisations to dutifully create projects that can follow this timeline of advancement and to keep in pace with the vastly growing technology. Ensuring thorough connectivity will lead to every mobile device or iPads or even a laptop to be connected to the smart city server. This way when we seek to sort out a parking issue by means of a smart parking facility or we seek for some garbage disposal, for example, in unfamiliar surroundings, the network and devices can guide us. A huge initiative for this encompassment comes from building public properties accessible to everyone. This way even the most remote and unadvanced users can benefit from the assistance of technology.

3.2 Enabling users' capacitance

The digital divide need not be an impossible demon to tackle. We can incorporate every technology we need into a basic smartphone that can connect to the cloud and make changes to the user's surroundings. These days almost everyone has a smart device, it need not necessarily be a fast-paced, huge RAM, cool processor device. A basic smartphone should be able to fulfill all the duties a user needs to perform with his surroundings.The daily data that needs to be recovered and used by the user can be stored on the cloud using a simple mail account from the user with a heavy password. This will both ensure the safety of user data in case of theft of devices or any other such concern and also make it viable and feasible for the user to user their device for connecting to the city servers on an everyday basis. In such cases, even if the user does not have access to smart watches or any other accessories, gears like others they should be able to properly and conveniently access the cloud and other resources.

3.3 Inviting denizens to leverage connectivity

By involving more users to understand, support and inculcate the proper usage of resources around them, we can further bridge the digital divide by enhancing responses of users to the city. With users enthusiastically utilising publicly available resources in the right and efficient manner, it will no longer be a question of access and otherwise. This can be done by a nonprofit, or a local educational institution to take it upon themselves to help inculcate user involvement among habitants. We can rightly investigate the role of such technological processes in improving a smart city's formation. [17] The users can shed their differences and work as a community together to work and use the resources available to them. As idealistic as it may sound, if users want to live in a smart environment it is not that big a price to pay. The bigger aim of smart city is also to reduce costs, which will ensure that such accommodation and resources are not pricey or privileged to begin with. Be in such, if it is a resource meant for the people regardless of their financial or technological prowess, then a smart city can be a useful, impeccable tool for generations to come. Also by taking feedback from people on how to improve their locality, we can go a long way in determining what problems denizens are facing and how to tackle them.

3.4 Kista Science City: A case study

Since 1994, we have all heard of the revolutionary Stockholm fiber optic network which private companies and service providers are able to lease equally. Stockholm has had many such initiatives into building a semblance of a smart city. To make it specific, we can approach Kista Science City in Stockholm which has all the political, industrial and technological aspects needed for a successful smart city. They have an e-Stockholm platform under their Green IT Strategy (which aims to reduce any harsh environmental impacts due to their technologies) which provides variegated e-services, vehicular parking booking and snow clearance during bad climatic conditions. They have state-of-the-art GPS services to help their citizens navigate through rush hour traffic and map a route to their destinations regularly and tirelessly.

IV. RESULTS AND DISCUSSION

Initially, we start off with creative approaches to involve citizens in the evolution of our smart cities. We further this approach with timely training scenarios and endowment of feasible, incorporated connecting networks, which will assist the users throughout their ecosystems. This is further enhanced by the use and feedback of the inhabitants of the smart city who will then become real life examples of how to make such a city work. We need to ensure that organisations that take up such projects not

only ensure easy, viable access to their technology but also that it benefits everyone using it. There is a simple line between the support needed to introduce and master technological aspects. Our smart cities just need to fall somewhere in between.

V. CONCLUSION AND FUTURE WORK

Thus, a smart city is a genius tool in the hands of the common man. Such surroundings and type of living can further comfort and enhance individuals. The combination of intelligent learning and having a core system have our data, habits and perform menial chores is a step into the future where humans can sit back, relax and let the machines perform the banal work. A smart city will be an overall leap for the technology today and once they are brought into perfect conditions of existence, with minimal to no improvement required, they will be a great asset in the hands of their inhabitants. The cloud has never had such a vast opportunity to help the people in such a direct and as-per-need fashion, a smart city can literally work on our common, ordinary life activities. The future work for smart cities will be to integrate different ecosystems together to ensure knowledge sharing in a vast, combinatory cloud. So that we can have access to a worldwide network of connectivity and further advance our technological projects

.

REFERENCE

[1] Mahmood, S.S., Levy, D., Vasan, R.S. and Wang, T.J., 2014. The Framingham Heart Study and the epidemiology of cardiovascular disease: a historical perspective. *The lancet*, *383*(9921), pp.999-1008.

[2] S. Dirks, C. Gurdgiev, M. Keeling, "Smarter cities for smarter growth: How cities can optimize their systems for the talent-based economy", IBM Global Business Services Executive Report.

[3] Chia, Eng Seng., "Singapore's smart nation program — Enablers and Challenges", 1-5, 10.1109/SYSOSE.2016.7542892, 2016.

[4] R. Aijaz, "Challenge of Making Smart Cities in India", Asie.Visions, No.87, Ifri, October 2016.

[5] Beck, A., Stave, K. (2011). "Understanding urban quality of life and sustainability", School of Environmental and Public Affairs, University of Nevada Las Vegas.

[6] Aijaz, Rumi and Kristian Hoelscher. 'India's Smart Cities Mission: An Assessment'. *ORF Issue Brief.* No. 124, December 2015.

[7] Caragliu, A., Del Bo, C., Nijkamp, P., "Smart Cities in Europe", 3rd Central European Conference in Regional Science – CERS, 2009.

[8] Ministry of Urban Development (MoUD). *Smart Cities: Mission Statements and Guidelines.* New Delhi: Government of India, 2015.

[9] Dirks S., Keeling M., "A Vision of Smarter Cities", IBM Institute for Business Value, 2009.

[10] Hall R., "The Vision of a Smart City", 2nd International Life Extension Technology Workshop,Paris, September 2000.

[11] Shaffers H., Komninos N., Pallot M., Trousse,B., Nilsson, M., Oliveira, A., "Smart Cities and the Future Internet: Towards Cooperation Framework for Open Innovation", SpringerLink.com, 2011.

[12] Selvakanmani S., "Smart City –The Urban Intelligence of India", Volume 3 Issue VI, 2015, ISSN: 2321-9653

[13] Meijer A., Bolivar M. P. R., "Governing the smart city: a review of the literature on smart urban governance", 2016.

[14] Ciaramella A., Bellintani S., Savio L., et al, "Smart furniture and smart city", 2018, IOP Conf. Ser.: Mater. Sci. Eng. 365 022012.

[15] Bayulken B., Huisingh D, "Are lessons from eco-towns helping planners make more effective progress in transforming cities into sustainable urban systems: a literature review" (part 2 of 2), Journal of Cleaner Production, 109, 152–165, 2015.

[16] Marsal-Llacuna, M. L., Segal, M. E., "The Intelligenter Method (I) for making "smarter" city projects and plans", Cities, 55, 127–138, 2016.

[17] Adegboyega Ojo, Edward Curry, and Tomasz Janowski, 2014, "DESIGNING NEXT GENERATION SMART CITY INITIATIVES -HARNESSING FINDINGS AND LESSONS FROM A STUDY OF TEN SMART CITY PROGRAMS", Proceedings of theEuropean Conference on Information Systems (ECIS) 2014, Tel Aviv, Israel, June 9-11, 2014, ISBN 978-0-9915567-0-0.

[18] Yigitcanlar T., "Smart cities: An effective urban development and management model?" Australian Planner, 52(1), 27–34, 2015.