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RESEARCH ARTICLE

SHOULD A SMART CITY BE A SAFE CITY FIRST?

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Abstract

The Government of India launched the 100 Smart City Mission on June 25, 2015, where in 100 India urban cities would be developed into Smart Cities. Given this information, the first question which needs to be answered is what is a smart city? According to the website for Smart Cities Mission, there is no clear definition of a smart city. It varies from city to city and country to country according to the development, willingness to change, resources and aspirations of the citizen. Some basic features of development in smart cities are:

1. Effective land use
2. Housing opportunities for all
3. Security of the citizens
4. Preservation and development of open spaces
5. Integrated transport options
6. Citizen friendly Governance

There are certain stages of development for a smart city to come into existence; of which the very basic level is to equip the city with surveillance. Though surveillance is the primary need for a society to keep its citizens safe; a good number of cities in India lack this basic infrastructure. Another useful objective of having surveillance in place is that the data collected through technology surveillance mechanisms can be collated and shared with other departments engaged in maintaining the physical and social conditions of the city viz. public works department, health department, water department, electricity department and so on. The data can be processed to devise basic solutions to address basic human needs.

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Introduction:-

Contextual Backdrop:-

A safe city also is some ways is considered a smart city. The question which needs to be answered is what is a safe city? Along with the smart city initiative, the Ministry of Home Affairs and the Ministry of Urban Development proposed that a city can be enhanced to a smart city only if it is a safe city first. These safe cities should have the latest security equipment like CCTVs, Command Control Centers, Tier- 3 Data Centers, patrol cars, aerial surveillance etc., which would enable safer living conditions for the public. A secure city also drives in a lot of investment leading to better job opportunities and rapid economic growth. At present the safe city project covers only seven major metros – Delhi, Mumbai, Hyderabad, Chennai, Kolkata, Bengaluru and Ahmedabad.

According to a report released recently, by the Smart Cities Council (a consortium of smart city practitioners), on the role of 'Role of Surveillance in Securing Cities', the global video surveillance industry is expected to grow at a CAGR of 12% over 2015-2021 to a total of \$49 billion by 2021.

As mentioned, a smart city is a combination of features which makes the integration aspect extremely important. When this concept of safe city acts as the base of any smart city initiative, integrating the other services becomes easier. Developing independent units of smart departments would not be an efficient method of going about a smart city initiative because the collaboration effort at the end would become very huge. Instead, an integrative development should happen

Research Objective:-

A comprehensive study on building efficient smart cities on a strong base of integrated city surveillance systems coupled with sensors and advanced analytics to detect abnormality at any part of the city. The base would strongly collaborate with all the other departments which play a significant role in building a smart city to provide solutions to all the problems a citizen faces without the citizen having to register any complaint and at a very low turnaround time.

Methodology:-

The methodology followed was to have one on one interviews with people from various cities to understand the issues they frequently face. Then a comprehensive list of the major departments of a state was chalked out and the issues faced by the citizens were mapped to each department. Based on the understanding of a fully integrated city surveillance system, solutions for immediate detection of the issues mapped to various departments were devised.

Analysis and Solutions:-

Municipal Corporation:-

There are several tasks and challenges which come under the purview of the Municipal Corporation. A few of them can be listed as follows:

1. Potholes on roads leading to severe traffic congestions, injuries ultimately increasing the pollution levels. The covering up of these potholes for a comfortable commute is the responsibility of the municipal corporation
2. There are multiple illegal hoardings erected at unauthorized places without the consent of the municipal corporation and sometimes without the consent of the building residents, thereby causing great discomfort for the public in general. Such issues need to be tackled by the municipal corporation.
3. Overflowing dustbins and sometimes theft of those bins is a very common scenario in growing metropolitans. Because of the increasing populations, sometimes the municipal corporation faces shortage of time in clearance of these bins or installation of new bins causing unhygienic conditions.
4. Garbage dumping at un-authorized places is an aggressively increasing issue that needs to be tackled by municipal corporation. The major reason is because of lack of space for handling such huge amounts of garbage and because of lack of effective methods to recycle the re-usable garbage.
5. Open defecation at public places leading to unhygienic conditions needs to be tackled by municipal corporation by properly maintaining the sanitation of public toilets.
6. Street lights at several junctions are non-functional and sometimes even beyond repair and no one reports them on time. municipal corporation often finds it difficult to track such non-functional street lights and by the time they are repaired/replaced a significant amount of time has lapsed.
7. During the rainy season, many residential areas face severe issues because of fallen trees, fallen electric cables and damaged buildings. Such issues must be addressed by the municipal corporation for restoring normalcy
8. Rule breaking at parks and open spaces is a very common offence which does not seem big when compared to other challenges but causes discomfort to the public.
9. Registration of deaths of homeless individuals is a common problem that municipal corporation takes care of and faces issues regarding the accuracy of the data.
10. Encroachment of government land illegally is a big scam which is currently a menace in metros and towns, and the government is trying to tackle the issue.

Solutions Offered for Municipal Corporation:-

1. The pothole menace can be better managed through the video surveillance of the roads and immediate alerts being sent to the municipal corporation reporting the pothole along with video and images. Places where the

camera cannot capture its feed can be analyzed through data analytics and possible locations where there could be congestions and their reasons can be listed out allowing municipal corporation to take further actions.

2. Illegal hoardings can also be swiftly tracked with the help of video analytics.
3. Overflowing dustbin issue indicates that the locality has more garbage generation than anticipated. Data analytics can be applied for the possible nearest locations where additional bins should be placed to avoid overflowing of one bin.
4. Waste dumping can be detected through video analytics and necessary measures to dispose it off would be suggested by the data analytics. Also, the source of the waste dumping can be tracked and additional localities where the dustbins can be placed to avoid the waste dumping will also be suggested.
5. For future purposes, proper segregation of the waste land for the people to dump the waste accordingly can be done through the data analytics.
6. Open defecation can be detected through video surveillance and people can be fined. Places where this issue is prevalent can be analysed and a list of locations where public toilets need to installed can be found out through data analytics
7. Fallen trees, non-functional street lights and rule breaking at parks and public places can be easily tracked through video surveillance and analytics and necessary action can be taken.
8. Encroachment of government land can be tracked with the help of video and data analytics wherein a list of all government lands can be formed and video surveillance of all these areas can be done. Any construction on these lands can be immediately tracked and necessary action can be taken.

Water Works and Sewerage Board:-

This is one of the most important departments for any state because if they delay their operations even by a few hours many areas would face water crisis. The many tasks of the water work and sewerage department and the different challenges they might face are listed as below:

1. Water pipe leakages lead to several hundreds of tonnes of water wastage and people sometimes do not report such issues. It takes a lot of time for the water works department to find out about this damage and repair it.
2. Sewage pipelines getting blocked is a very common phenomenon creating a very unhygienic environment for the residents which are reported to the Water works and Sewerage Board.
3. The intersection of sewage pipes and water pipelines gets damaged in certain circumstances and such situations require immediate action because people could be prone to several diseases if they were to consume the infected water.
4. Chlorination of public water tanks and pipelines at regular interval for avoiding any fungal or bacterial infections in the water
5. Uncovered manholes are a serious issue because people have lost lives after falling into these manholes and hurting themselves. Such issues also come under the purview of the water works department.
6. Flooding, accumulations and stagnation of water at different parts of the city is turning into a home for all the bacteria and mosquitoes causing malaria, dengue etc., to the residents. Such issues also need to be tackled and appropriately dealt with.
7. Unapproved pumping of water and turning them into a dry land for illegal constructions is a huge crisis for the people of any city. These issues can also be dealt with appropriate collaborations with the concerned departments
8. Taking necessary actions for water which has more than the acceptable levels of chlorine content

Solutions Offered for Water Works and Sewerage Board:-

1. Water pipeline leakage, blocked sewage pipes and, damage of the intersections of both the pipes can be tracked through video surveillance and analytics.
2. Chlorination of water tanks can be regularly tracked by the data analytics and which tanks require immediate action would be shown time to time.
3. Uncovered manholes can be detected with the help of video analysis. In case of camera not being able to capture that area, then the traffic patterns can be analyzed and the reason can be deduced after which necessary action can be taken by the concerned department
4. Flooding, accumulation and stagnation of water can be detected through video analytics. In case of camera angle not being able to capture the area then the data analytics can be used to track the moisture levels and necessary action can be taken

5. Construction over dried water bodies or deliberate drying of water bodies can most definitely be tracked by video analytics. Also, the humidity levels will drastically change if a water body is deliberately pumped out and thus illegal activities can be tracked.

State Road Transport Corporation:-

The State Road Transport Corporation(SRTC) takes care of the entire public road transport in the city comprising of the following tasks and challenges:

1. Growing population levels in the city have led to overcrowding of buses especially at peak hours making travel extremely uncomfortable. The approximate number of buses required to make everyone’s travel comfortable is something which SRTC has not been able to achieve with accurate results
2. Number of buses damaged during transit and damaged during riots and immediate replacement to not affect the common man’s life is one of the other important duties of SRTC
3. Interstate collaboration to allow buses from a different state to enter the city and vice versa is fulfilled by the SRTC.
4. Eve-teasing and inappropriate behavior towards women during travel has become a menace and the SRTC is also looking to tackle this issue by starting ‘She Shuttles’ at several cities across the country.
5. Keeping track of the number of people preferring bus as a mode of transport for overnight travel and ensuring adequate number of buses are available
6. During strikes of other modes of transport, assessing the situation to install the required number of additional buses is of paramount importance

Solutions Offered for State Road Transport Corporation:-

1. The number of commuters at all the bus stations during peak hours and non-peak hours can be captured with video analytics. Data analytics can be applied to find out number of buses required in different routes based on peak and non-peak hours. Thus making the budget projection more accurate and comfort level also increases.
2. During riot situations, the video surveillance can be constantly monitored and any violent activities like setting ablaze of buses can be immediately stopped. Using data analytics the possible areas of riots can be pre-determined and necessary precautions can be taken
3. All the interstate intersections can be monitored and any disturbances found through video surveillance can be reported immediately to the nearest patrol vehicle.
4. Mapping the she-shuttles accurately with the help of data analytics such that the waiting time for women at bus stops decreases thus making it safer for women. Any incident of eve-teasing or violence can be avoided and appropriate action can be immediately taken.
5. During a transport strike, mapping the required number of buses in different directions is possible through data analytics

Tourism Department:-

The tourist attractions in metros are quite a few in number and these happen to be almost always crowded. Due to this the entry and exits of these tourist attractions should always be on alert for any suspicious activities. A few of the common tourist places are as mentioned below

1. The famous tombs are a major tourist attractions and usually heavily crowded because the area predominantly is bustling with commoners going about their day. Any damage or violence can be a threat to the tourists and should be taken care of by the tourism department.
2. There are many ancient forts and palaces where people visit and these monuments are prone to the maximum damage because of reckless attitude of the visitors.
3. There many religious places with a mix of Hindu temples and Muslim mosques. These areas are always on alert for any kind of communal incidents and the tourism department must ensure the tourist safety in such scenarios
4. There are numerous museums and planetariums that hold a lot of archeological value and are generally full of visitors. The tourism department must ensure that these artefacts and the museum is well protected from any kind of incident.
5. There are quite a few artificial lakes/natural water bodies on the periphery of which there are numerous eateries and parks located. These locations do not only have tourists but also have locals visiting them. Such lakes are supposed to be well maintained and the safety of these locations should also be ensured by the tourist department

6. There could be wild life sanctuaries in the city where tourists and animal lovers from all over the country visit. Safety of these animals from the tourists, and safety of the public from these animals must be ensured by the tourist department along with the officials of the sanctuary

Solutions Offered for Tourism Department:-

1. All the tourist locations like the tombs, ancient forts and palaces, museums and planetariums can be constantly monitored with the help of video surveillance and video analytics. Data analytics along with video analytics can also be used for finding out the level of natural damage and extent of restoration required accurately. Any kind of damage being forced on the building by the visitors, can be captured by the video surveillance and the culprit can be fined at the exit gate
2. The places of the city where there is blend of different ethnicities, can always be prepared for any kind of communal violence with the help of video analytics.
3. The artificial lakes and small water bodies can be better managed and can be cleaner if there is constant video surveillance prohibiting the public from soiling the lake. Also with the help of data analytics the extent of garbage dumping done in these lakes can be measured and appropriate cleaning methods can also be determined through the same.
4. The heavily crowded places like the shopping lanes in the city are majorly prone to terrorist activities because of bustling crowd, so these areas can be under heavy video surveillance especially at the entry and exit points. Also, facial recognition can help find out any known criminal or suspicious person from committing any sort of crime.

Power Department:-

The power department is responsible for generation, transmission and distribution of electricity. The major issues which the power department faces with respect to a functioning of a city can be outlined as follows

1. There have been several instances of blackouts of localities because of electricity failures. These events generally take time to be reported to the main office and by the time electricity is restored and normalcy is achieved there is a considerable delay.
2. Often the transformer fails or erupts because of equipment meltdown. Such issues are also reported to the power department and there is a time gap between the power loss and restore
3. Several power equipment is stolen because they have copper wires or copper rods. This leads to disruption of daily activities and the culprits are not caught because the detection itself happens after several hours.
4. There have been instances when the overhead wires in the localities loosen up and hang low causing a threat to the commoners and such issues take several days to get reported at the power department
5. Certain heavy vehicles tend to damage the overhead vehicles if the gap is too low. People do not notice this accidental damage and repair takes time because of the delay in reporting.
6. There are several instances where people and connect steal the electricity from the community electricity poles. Such incidents generally do not get reported and leads to huge losses to the power department
7. During rainy seasons, because of the fallen trees or because of heavy winds the overhead connected wires break and live wires dangle onto the puddles of accumulated rain water. This is a very dangerous and fatal condition for the residents who live nearby and should be immediately rectified.

Solutions Offered for Power Department:-

1. Blackouts and transformer fails in the city can be immediately detected through video surveillance and the nearest patrol vehicles can be informed for further action and collaboration.
2. Theft of power equipment and theft of electricity can be detected through video analytics.
3. Damage to the overhead wires because of rain or vehicles can also be detected. Based on the video surveillance, the possible list of locations where the overhead wires are prone to damage can be pre-determined with the help of data analytics and necessary action can be taken on priority.

Fire Department:-

Fire can break out due to several incidents and many a times the fire department must work in collaboration with other departments to control the fire. In such situations, the multi-agency collaboration of resources can be of huge help to the fire department. The scenarios which the fire department faces and the challenges it must overcome can be listed as follows:

1. Incidents of fires because of short circuits in a building are the most common kind of fire incidents which the fire department are faced with and there is considerable damage by the time they receive phone calls and alert the nearest firefighting office.
2. Fires that are most likely to occur also include the petrol stations. Because of the combustible substance being present in such huge quantities, even a small mistake can lead to fires and such incidents are also dealt by the fire department
3. Fires at small scale industries present inside the city are also dealt by the fire department. The delay if any is caused because the delay in the relay of information
4. Fires at the waste dumping lands are very common because of the accumulation of so many different types of waste materials at one place. Often substances react with each other and fire erupts. In case of uncontrollable fire that might spread across the other parts of the locality then the fire department steps in to control the situation
5. Fires because of gas explosions at residential areas is also one very common fire accident leading to loss of many lives.
6. During political riots, the buses, shop etc., are set ablaze by the angry protestors. The police would require the help of the fire department in such situations also to ensure the safety of the public.
7. Breaking out of fires in public spaces like restaurants, movie theatres, railway stations, office buildings etc., should also be attended to by the fire department immediately.

Solutions Offered for Fire Department:-

1. Possible list of areas which are prone to fire accidents in different weather conditions can be formed with the help of data analytics and necessary precautions can be taken to avoid the fire accident in the first place.
2. Heavy surveillance at the petrol stations and industrial areas especially at the entry and exit gates to detect the presence of any inflammable substance to avoid the fire accidents.
3. In case of events of fire accidents, instant simultaneous alerts to the nearest fire station, water department and the patrol vehicle can be sent through video analytics and lives can be saved.
4. Dumping yards can be monitored and data analytics can be applied to segregate the garbage into recyclable, biodegradable and combustible/harmful substances. In case sudden inflaming of the waste in the dump yard, immediate alerts can be sent to the nearest fire department.
5. During political riots and curfews, setting ablaze of vehicles can be detected through video analytics and immediate action can be taken by the fire department because of the timely alerts.
6. Fire accidents at public places like restaurants, theatres or residential places can be immediately detected through video analytics and the extent of damage can also be gauged. Based on this the required number of resources can be dispatched to the location.

Metro Rail, Railway Authority and Airports:-

The metro rail still being under construction in a few cities is prone to accidents and delays. At the same time the railway department and the airports are always on constant alert and lookout for any kind of suspicious activity in a railway station because it always crowded with commuters. The challenges which the railway department/metro/airports face in its every day functioning are detailed as follows:

1. With a few metros still under construction, the tracking of all the junctions and stations takes a lot of time and coordination. Delays and accidents also are not immediately relayed causing the
2. The railway stations and functioning metros being crowded always requires constant vigilance and look out for any suspicious activity or personnel
3. All the rail and road intersections need to be constantly monitored for any rule breaking
4. Any unidentified baggage left within the confines of the airport/railway station need to be identified immediately and necessary actions need to be taken.

Solutions Offered for Metro Rail, Railway Authority and Airports:-

1. The railway stations/ airports/metro can be constantly monitored through video analytics and facial recognition for identifying any suspicious person or known criminals.
2. The current metro rail currently under construction, possible scenarios where accidents could occur could be listed out and necessary precautions can be taken by the on-ground personnel
3. Any un-claimed baggage found at any location can be immediately tracked back to the owner and necessary precautions can be taken with the help of video and data analytics along with facial recognition.

4. Possible list of locations which are most prone to threats which can go un-noticed can be listed out with the help of data analytics and these locations can have increased security.

Conclusion:-

There are several aspects which should be considered when studying the approach taken for a smart city. The two major aspects would be, a) Monetary aspect b) Time aspect.

If the approach of developing individual smart departments which would be integrated later is being followed, there is a duplicity of effort as well as infrastructure which leads to high investments in all departments. Rather, the approach of having a safe city with all the surveillance, data centres and mobile control centres lay the foundation first and then the other departments form a collaborative and integrative relationship would lead to significant cost savings and reduction of efforts. This approach would also mean that at each level of development, integration is done simultaneously. Similarly, for the time aspect, a lot of time can be saved if the second approach to a smart city is followed, because the duplicity of effort would not take place.

Another aspect which could lead to potential problems, is the maintenance of all the equipment. When the installation phase and warranty period is over, the maintenance of the equipment falls under the purview of the government. A combination of effort from the private firms as well as the government should be made to keep the systems running long after their warranty phase.

Finally, a cultural change should start and gradually be adopted by all the citizens and officials wherein, the officials start to work as a network of teams rather than silos and on the other hand the citizens adapt to these sophisticated improvements and be responsible enough to use these improvements wisely and help government in improving their lives.

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