

SURAKSHA SETU

Safe City Project



Government of Surat, Gujarat

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Executive summary

The population of Surat City is roughly 5.2 million and spans over 326 sq. km and is on continuous rise due to influx. It is the 2nd largest city of Gujarat and the 9th largest city of India.

Due to increase in the population there was high volume of traffic as well as fall in police – people ratio. There was also increase in terrorist activities. There was a need for traffic awareness program to inculcate safety discipline into the people.

Keeping these things in mind, Government of Gujarat launched an initiative and installed 604 Cameras for city wide surveillance at 113 locations across the city. Apart from this, a total of 16 workstations have been setup for live monitoring of the surveillance system.

This is one of the first Safe City projects of India and has been nominated for Prime Minister's award for Excellence in Administration. Owing to the success of this project a similar project was launched in Vadodara on small scale

Introduction

Surat, one of the prominent cities of Gujarat is a center of major commercial activities including those related to petro-chemicals, diamond and textiles. This has led to tremendous urbanization bringing major employment opportunities. Unfortunately one of the aspects associated with rapid urbanization is a tendency of increasing crime rates which must be faced head on to provide a sense of safety to inhabitants of a prominent metropolitan. This was the primary driver behind the conceptualization of the project.

The initiative has been spearheaded by the Commissioner of Police, Surat City and is aimed at providing a city wide state of the art surveillance system which provides the following services:

1. Traffic Management
2. Surveillance
3. Post-Incidence Forensic Examination
4. Disaster Management

Overview of the project owner

Shri. Rakesh Asthaana

IPS, Commissioner of Police, Surat City

He has rich experience of having served in various districts/cities in Gujarat and in Central Bureau of Investigation (CBI) in various capacities. Mr. Asthaana realized that as Surat was increasing in terms of population size, safety of citizens and assets was a prime concern. To manage all city growing infrastructures as well as to address citizen's safety needs, he convinced all stake holders regarding the usefulness of the project and motivated the corporates, business houses, eminent citizens of the city for mobilizing the funds for financing the project. He had adhered to the principles of transparency and fair play in the execution of the project which enabled him to win the trust and confidence of all the stake holders. He had constituted teams and had assigned different task to each team, supervised these projects and coordinated the efforts for the successful implementation of the project. They had excellent rapport with the representative of M/s. Innovative Telecom & Software Pvt. Ltd. and others which ensured the implementation of the project in the time frame.

Project overview

Triggers for the project

1. High Volume of Vehicular Traffic

The city has 2.81 million registered motor vehicles and a large number of vehicles visit/pass through the city for various economic activities. The issues such as poor urban planning, lack of public transport system, dependence of the general population on auto-rickshaw and motor cycles, inadequate man power available with the law enforcement agency make the task of traffic management and enforcement difficult.

2. Threat of Terrorist Activities

The city has pockets of mixed population and history of communal clashes. The thriving economy, presence of migrant population, long coast on the west dotted with landing points and the proximity with Mumbai expose the city to the threats of terrorism

3. Rising Population leading to poor people police ratio

The rising population, presence of migrants, growth of slums, increasing socio-economic inequalities, unemployment, lure of quick bucks among youth etc. is leading to rise in crime. The police-people ratio is a measure of public safety and United Nations has prescribed 222 policemen per 100,000 populations as the minimum scale. However, the police-people ratio in Surat City is 73 per 100,000 populations.

4. Incidents of Terrorism in recent past

Various terrorist attack incidents in the past have highlighted the needs for proper mechanisms to protect vital installations, public places, prevent and detect crime, traffic management and enforcement.

5. Traffic Awareness Movements

Various traffic awareness programs with the motto of safety-discipline-awareness were launched to reach the public through hoardings, banners, posters, pamphlets, distribution of hand bands, painting competition for school/college students, photography competition, street play, seminars and workshops. The idea of closed circuit television (CCTV) camera based surveillance system for better enforcement and traffic management was discussed during I-follow campaigns and the demand for such as system started coming from representatives of industries, eminent citizens and various other stakeholders.

Suraksha Setu is a community policing initiative launched by Government of Gujarat for strengthening police-public partnership. It has provided budgetary support for taking up innovative projects for the benefit of general public.

These factors along with a rapidly growing dependence on ICT tools for better governance led to the Police Commissionerate's decision of embarking on this ambitious project

Scope of services

The project is designed for surveillance, crime prevention and detection, post incident forensic examination, traffic management and enforcement, for providing disaster management support and pollution control measures (Pollution Sensors)

i. Cameras

There are 604 IP cameras including 26 PTZ cameras (360° view) and 578 fixed cameras (Day & Night Vision) installed in 113 strategic locations with local power backup. These cameras are connected to the Command and Control Center through the dedicated 200 km long underground dark optical fiber network.

ii. Command & control center

A state of the art, fully air conditioned hall with 280 ft. Video Wall with 9x2 LED Projection Cubes of 67 inches, with 1024x768 resolutions. The Video Wall has the capacity to view 256 cameras at a time. It has 16-workstations, Emergency War Room, Video Management & Incident Management System, camera tampering and health sensors. The data center is equipped with IBM Servers with a storage capacity of 210 TB for 30-days. The police wireless communication room and Dial-100 system has been integrated with the Command & Control Center.

iii. Enforcement automation center

It has access to RTO database for issuing e-challans with photograph of the traffic offenders. Surat City Police has entered in to a Memorandum of Understanding (MoU) with Dena Bank declaring its branches and ATMs in Surat City and neighboring Districts as collection centers for the collection of fines from the traffic offenders. More than 2, 83,091 e-challans have been issued.

iv. Safety and security

The Data Centre is equipped with rodent repellent, fire alarms, water leak sensors, FM 200 fire suppression system and access control system. The Command & Control Center is erected on the first floor keeping floods into consideration with emergency exit and weather proof IP66 housing. It is also equipped with traceable camera tampering, redundant UPS, camera recoding export protection, redundant PAC, redundant UPS and anti-static false floor

v. Other utilities

The video wall is 2D map integrated and IP cameras are integrated with the 2D map. The camera can be popped up by just a click on the map. The system enables installation of GPS in police control room (PCR) vans for vehicle tracking for coordinating police responses to Dial-100 calls.it has Integrated Traffic Management System (ITMS),Disaster management, Rescue and evacuation management, post incident forensic examination, automatic number plate recognition (ANPR), face recognition system, frame by frame playback of video, abandoned

object identification, head counting, loitering identification, intrusion detection and pollution sensors.

Innovation

The security surveillance system has helped to cover several aspects of Police Administration at one go thus turning Surat into India's first Safe City. With a plan for further expansion, the city intends to further tighten security measures and excel in Traffic Enforcement and Regulation. The Surveillance project has helped in the following areas:

1. Traffic Regulation and Enforcement

- eChallan System for Traffic violation
- Automatic Number Plate Recognition
- Traffic Rules Violation

2. Policing Services

- Crime prevention and Detection 27% crime rate has gone down in areas where cameras have been installed. 58 numbers of cases (under various heads) detected with the help of CCTV footages.
- Debriefing
- Post Incident Forensics services
- Traffic Management
- Disaster Management

3. Pollution Sensors

4. Integration of Maps with Cameras to get location related information

5. GPS Integration and vehicle tracking system

6. Police Resource Management System

7. Integrated Traffic Management System

8. Integrated Signal Management System

Modalities of the new system

Implementation model

1. Traffic Education Trust was used for the implementation of the project in public-private-people-partnership (4P) model.
2. A technical committee comprising of Prof. Rakesh Gohil, Head, Department of Computer Science, SVNIT, Surat and 4-other eminent citizens with technical back ground was constituted for the finalization of technical specifications and overseeing the implementation of the project.
3. Five sub-groups comprising of Police Officers and Members of Traffic Education Trust were constituted for holding a series of meeting with stakeholder and mobilization of funds.
4. 104-cameras were to be installed in 23-strategic locations and a Command & Control Center with video wall, video analytics and data center was to be set up at Police Bhavan as part of Phase-I. Shri. Sanjay Srivastava, IPS, the then Jt. Commissioner of Police (Sector-II), Surat City was initially appointed as the Nodal Officer for the implementation of the project.
5. Tender was issued on a transparent procedure prescribed by the World Bank. It was adopted for awarding works under the private-public-partnership (PPP) model was followed. M/s. Innovative Telecom & Software Private Limited, Surat which had tied up with M/s. Verint Systems Limited, Israel and M/s. Delta, U.S.A. was awarded contract for the installation of cameras and setting up of Command & Control Center on 28.08.2012.
6. M/s. RK Infratel Limited, Surat was awarded the work related to networking of cameras. The companies had commenced their work from 30.08.2012 and had completed the same by 31.12.2012, in a record time of 4-months.
7. It was decided to go for CCTV based surveillance system covering vital installations, entry-exit points, markets, public places, busy traffic junctions and crime prone areas in first phase so as to win the confidence of the people.
8. A non-intrusive and transparent e-challan system was introduced for enforcement of traffic rules with option of paying for fines at Dena Bank

Communication and dissemination strategy and approach:

Certain promotional activities were conducted to ensure that citizens are well aware of the project and the potential benefits. Higher involvement from citizens and industry was expected to lead to better acceptance and faster implementation.

1. Surat Night Half Marathon (23rd February, 2012) was used to motivate people and popularize (CCTV) camera based surveillance system for traffic management.
2. Meetings were held by senior police officers to reach out to educate them about the positive impact of closed circuit television (CCTV) camera based surveillance system on policing.

3. The awareness campaign under the I-follow program was used for building public opinion in favor of installing this surveillance and traffic management system
4. The peoples support was channelized through the forum of Traffic Education Trust and active participation of local corporates, business houses, eminent citizens and service organizations
6. Publicity in print and electronic media for educating the people regarding the benefits of camera based surveillance system on policing by using real time examples

Technology platform

1. Description

Surveillance Camera

- Verint
- 2 MP IP camera
- Day and Night vision, Local Power Backup, Capable of detecting number plates
- 36x Zoom PTZ cameras for 360* vision
- Local storage capacity
- Two way audio communication

Data Center

- IBM Blade servers
- 210 TB for 30 day storage
- Precision Air Conditioners

2. Interoperability

Integration with various other IP based systems possible through their API as the system is based on open WINDOWS platform.

3. Security concerns

Security concerns in ICT based administration are inevitable but the concerns can be covered sufficiently. In this case the following tools were used:

1. Access control centers at the Command Center
2. Water Leak Sensors, Rodent repellent, Fire alarms for Data Center
3. FM 200 Fire Suppression system
4. Weather proof IP66 Housing
5. Traceable Camera Tampering
6. Redundant UPS
7. Camera Recording cannot be exported
8. Redundant PAC and Power Supply
9. Anti-static false floor

10. Command Center has been built on 1st Floor to prevent disruption due to flooding and Emergency exits have been provided.

4. Any issue with the technology used

The system has never gone down for even a minute in last months of operations. The architecture design and planning done by SI is redundant and very much robust.

5. Service level Agreements(SLAs)

SLA signed and documented with this Systems Integrator and Network provider.

Citizen centricity

(i) Impact on effort, time and cost incurred by user

While citizens don't need to interact with this system on a daily basis, the final benefits of the safe city project are borne by them in the way of a feeling a being safe and better enforcement of rules and regulations throughout the city.

(ii) Audit Trails

The video record is stored in the data center which has a storage capacity of 210 TB for 30 days.

(iii) Interactive platform for service delivery,

A state of the art, fully air conditioned hall with 280 ft. Video Wall with 9x2 LED Projection Cubes of 67 inches, with 1024x768 resolutions. The Video Wall has the capacity to view 256 cameras at a time. It has 16-workstations, Emergency War Room, Video Management & Incident Management System, camera tampering and health sensors. City is monitored through this medium.

Adaptability and scalability

The system and platform is highly scalable horizontally and vertically without any limitations. The system is also capable of adding up additional modules for Smart city solutions, Disaster Management solutions, etc. (e.g. Pollution control sensors, Seismic Sensors, etc.). The technology used is completely on open platform with user friendly interface GUI.

Adaptability Analysis

(i) Measures to ensure adaptability and scalability

The technology used is on open standards platform hence easily adaptable and has no limits in terms of scalability.

(ii) Measures to ensure replicability

The system currently designed is completely redundant at all stages including servers, storage system, power backup, and all the applications. It has also capability of replica by creating a Disaster Recovery site.

(iii) Restrictions, if any, in replication and or scalability

There are no restrictions in terms of replication and scalability in the system.

(iv) Risk Analysis

The entire system is designed and contracted for 5 years warranty with comprehensive maintenance and later Maintenance agreements will be done with SI. Hence the smooth running of systems has been taken care from day one.

Efficiency enhancement

(i) **Volume of transactions processed** is 1.5 Petabytes by 604 cameras

(ii) **Coping with transaction volume growth**

The architecture design and planning has been taken care by SI to handle such a large volume of Data (i.e.) 1.5 Petabytes.

(iii) **Time taken to process transactions,**

The system architecture is designed to process each devices data pumping and 12 mbps for 24 x 7 x 365. This is done absolutely online without any data loss. The retrieval of data is also in milliseconds.

(iv) **Accuracy of output,**

The entire data is stored with best possible parameters and with exact date, time, and location stampings.

(v) **Number of delays in service delivery**

The proactive preventive maintenance and daily health check system is already done by SI on regular basis avoiding any downtime till date.

User convenience

(i) **Service delivery channels**

The CCTV cameras are IP cameras connected over the internet and monitored through the Command Centers. These are used as smart governance tools by law regulators to ensure safety of citizens and to ensure compliance to rules and regulations.

In case of traffic violations, e-Challans are produced. For the convenience to the citizens Surat Police has tied up with Dena Bank all branches across city for penalty collections.

(ii) Completeness of information provided to the users

The citizen's gets complete information related to eChallan like the photograph with time, date, location of violation.

(iii) Accessibility (Time Window),

The citizens can pay penalties during banking hours, during all working days.

(iv) Distance required for travelling to Access Points

For users of the Commissionerate as well, the monitoring is done from a central command centre and hence no travelling to Access Points is required.

(v) Facility for online/offline download and online submission of forms

The citizens get complete information related to eChallan like the photograph with time, date, location of violation.

(vi) Status tracking

(1) Tracking is done on the basis of number of violations done by citizens.

(2) Everyday reconciliation of payments receipts against penalties is done and notices are issued to all defaulters.

Impact on the stakeholders

Value delivered

1. To organization

The Surveillance system has helped to improve the operational efficiency of the police administration by a quantum amount. With a very poor police to people ratio initially, manual monitoring of various city parameters was humanly impossible. With a centrally monitored city, law enforcement has become easy and has streamlined processes.

2. To citizen

As explained, a rapidly urbanizing region is also equally exposed to a rapidly increasing crime rate which threatens to oppose development and creates unnecessary fear in the mind of citizens. The manner in which this project was implemented by keeping the city completely informed and involved has created a sense of safety in everyone's mind which is extremely crucial for a healthy city.

3. Other stakeholders

Some key objectives of the project which have been comprehensively fulfilled are:

- To develop an organized network of cameras to maximize surveillance and visibility in strategic and crime prone areas
- To reduce the opportunities for committing crime and terror attacks by employing access control systems, cameras and police personnel
- To develop post incident forensic examination tools for crime detection and investigation.
- To manage traffic at junctions by monitoring the volume of traffic and enforce traffic rules through non-intrusive methods.
- To manage and monitor the movement of VIPs /VVIPs and large public processions(Ganesh Immersion Procession, Taziya Procession, VIPs visit)
- To coordinate the efforts of various agencies for rescue, relief and rehabilitation during natural calamities and disasters Example: Floods, Cyclones

Future roadmap

1. The network will be expanded with 5104 cameras from 604 over a period of 3-years. Government of India and Government of Gujarat have planned Safe City Project in other cities and the Safe City Surat Project can serve as a model for the implementation of the same.
2. The technology, network and the software used are of international standard and are compatible with best of technologies available in the market.
3. The fine amount collected through e-challan system will go to Gujarat Marg Suraksha Nidhi, a corpus created for building traffic infrastructure in the state.
4. Surat City Police has entered in to agreements with M/s. Innovative Telecom & Software Pvt. Ltd. and M/s. RK Infrastructure Pvt. Ltd. for the maintenance of the project for the next 5-years.
5. 150-police officers of various ranks have been trained in the operation and maintenance of the Safe City Surat Project. The training of other 150-police officers has been planned for creating a cadre of trained personnel to ensure the sustainability of the project.
6. Standard Operating Procedures (SOPs) and User Manual have been prepared for the operation and maintenance.

Annexures

1. Stakeholder's consultations

Corporates & Business Houses: Participated at various stages of planning, design & implementation by providing human and material resources for the project and mobilized finances

Citizen Groups: Helped in popularizing CCTV camera based surveillance and traffic management system.

Housing Co-operative Societies: The residents of various localities and citizen groups had come forward for meeting the expenses of network expansion for securing their localities.

Traffic Education Trust: It had played key role in planning, technical and institutional support, mobilization of funds for the implementation of the project. I-follow movement had helped mobilizing people in favor of camera based surveillance and traffic management system.

Police Leadership: Shri. Rakesh Asthaana, IPS, Commissioner of Police, Surat City had conceived the idea of Safe City Project and had carried the experience of implementing the same in a small scale in Vadodara City during his previous tenure as Commissioner of Police, Vadodara City.

Shri. Sanjay Srivastava, IPS, Joint Commissioner of Police (Sector-II), Surat City: He was the Nodal Officer for the implementation of the Safe City Surat Project. A B.Tech. from NIT, Suratkal, he used his technical background in finalization of technical specifications, preparation of tender documents and processing of technical bids.

2. Comparative Analysis of earlier Vs new system

#	Performance Parameters	Impact	
		Before the Implementation	After the Implementation
1	Prevention of Crime	<ul style="list-style-type: none"> • Beat System for surveillance of criminals and anti-social elements • Foot Patrols, Car Patrols and Preventive Detentions • Surveillance based on human observation and analysis 	<ul style="list-style-type: none"> • CCTV Camera based surveillance system • Availability of video footages form archives for detailed analysis
2	Detection of Crime	<ul style="list-style-type: none"> • Crime Detection based on human intelligence • Dependence on evidences based on physical trails left by the criminals for the purpose of 	<ul style="list-style-type: none"> • Crime Detection based on video footages • The video footages serve as good piece of evidence in the court of law.

		prosecution	<ul style="list-style-type: none"> 58-cases detected. (chain snatching, hit and run cases, bag snatching, robbery in auto rickshaw etc.)
3	Traffic Management	<ul style="list-style-type: none"> Manual assessment of volume of traffic Incidents of traffic jams, congestion, road accidents are reported to the control room by the field officers leading to delay in police response and long traffic holdups 	<ul style="list-style-type: none"> Instructions to field staff regarding volume of traffic based on the analysis made in the Command & Control Center The analysis of video footages regarding traffic jams, road accidents has led to quick police response and reduction in road accidents.
4	Traffic Enforcement	<ul style="list-style-type: none"> Field enforcement teams stopping the traffic offenders for collection of fine Allegations of high handedness, abuse and corruption by police personnel 	<ul style="list-style-type: none"> 2,83,091 e-challans issued till date and total fine to the tune of Rs. 78,46,850/- collected. Non-intrusive method of enforcement has ensured transparency and reduction in corruption
5	Management of VIP/VVIP Movement	<ul style="list-style-type: none"> Long holdups, diversions during VIP/VVIP movements 	<ul style="list-style-type: none"> A well-coordinated traffic management during VIP/VVIP movements
6	Law and Order Management	<ul style="list-style-type: none"> Deployment of large posse of policemen for surveillance and crowd control Dependence on statements of eye witnesses for prosecution Difficulty for the supervisory officers in getting information regarding the development on the field on real time bases 	<ul style="list-style-type: none"> CCTV camera based surveillance serves as a deterrence The video footage service as clinching evidence against rioters Real time information to the supervisory officers The system was of help during Ganesh Immersion and Taja Procession Surat Night Half Marathon, an international event was held on 23.02.2013 without any incident
7.	Disaster Management	<ul style="list-style-type: none"> Delay in inter departmental coordination Dependence on field reports for monitoring the rescue and evacuation operations. 	<ul style="list-style-type: none"> Provides multi-mode communication system to coordinate the efforts of various agencies. Video based coordination for ensuring speedy rescue and evacuation operations The system was of great help during the fire accident on 05.01.2013 at Indian Oil Corporation, Hazira, Surat.