

Intelligent Transportation Systems

Smart City Ahmedabad gets IoT-driven buses

Customer

- Smart City Ahmedabad Development Limited (SCADL)

Challenges

- Address inefficiencies and poor customer experience of manually operated bus transport systems
- Develop a software-based, cashless bus transport system
- Improve bus service visibility to reduce operating costs and improve scheduling

Solution

- Implemented an intelligent transport management system to support seamless, safe, fast, and efficient bus services
- Develop IoT-driven automated fare collection, GPS-enhanced vehicle location, passenger information, vehicle and depot management systems
- Analyze and interpret scattered data to optimize resources and improve customer satisfaction

Results

- Improved bus service efficiency and commuter travel experience
- Identified popular and problem route areas, future investment requirements and opportunities
- Paved the way for an integrated multi-modal smart transport system and operating platform

Introduction

As one of India's fastest growing scientific and industrial hubs, the city of Ahmedabad was among the first 20 candidates selected for the government's Smart City Mission. Recognizing the vital importance of efficient public transport, Smart City Ahmedabad Development Limited (SCADL) partnered with NEC to upgrade the city's manually operated, often erratic bus transit infrastructure with a seamless, safe and reliable intelligent transport management system. Intelligently applied IoT and big data analysis technologies are enabling the city to build a smart bus system that is easy to plan, merge and grow along with its expanding footfall.

Challenges

Tackling the problems and inefficiencies of manually operated bus services

"Improving public transport is integral to smart city success. It is costly, but transferring passengers at attractive prices enables education, employment, and ultimately safe movement," advocates SCADL CEO, Rakesh Shankar.

Ahmedabad's two major bus services Bus Rapid Transit (BRT) and city bus AMTS operate 1,000 buses transporting 0.8 million passengers daily across the city. Despite attractive ticket prices, the bus services were underutilized due to customer concerns over quality. The previous manually operated system suffered from poor route planning, a lack of advertised bus schedules, bus-bunching, excessive waiting time, rough driving, stop skipping, and inconvenient or inconsistent cash collection. A lack of transparency also resulted in higher operating costs and customer complaint handling.

The city authorities were keen to upgrade to a cashless, software-based bus service system backed by advanced ICT to help reduce expenses and problem-response time.

"Smart transportation must offer ease of use for the traveler, transparency of services, and the ability to plan. We needed to understand entire routes and behavior, so we could deploy the right resources, add new vehicles and develop seamless transport services."



Solution

An IoT-driven transport management system fit for a budding smart city

SCADL partnered with NEC to implement an intelligent transport management system (ITMS) that improves the efficiency of BRT and AMTS bus services using a cashless open-loop card system. In addition to automated fare collection, the one-stop, IoT-driven system manages bus resources, bus maintenance, transport information, and personnel. It also collects and analyzes data to help optimize resources, and boost ticket sales. “Deploying the total set of systems helps provide information to citizens that eases the hustle and hassle of riding on public transport,” explains Shumpei Fujii, Head of the Transportation Business Unit at NEC Technologies India.

The ITMS incorporates five smart transport sub-systems:

1. **Automated Fare Collection Service (AFCS):** Quick and secure cashless payment via prepaid RuPay card or smartphone ensures greater convenience, passenger safety and ridership visibility.
2. **Automatic Vehicle Location System (AVLS):** Real-time visualization of vehicle location via fitted GPS enables the city to calculate estimated time of arrival and support bus operations from a central command center to adhere to a planned schedule.
3. **Passenger Information System (PIS):** Provide real-time bus information via mobile app, website and in-station boards to enable passengers to plan their route and estimate waiting and arrival times. Route and bus stop information is also provided via on-board displays and announcements.
4. **Vehicle Planning Schedule and Dispatch System (VPSD):** Bus routes and schedules optimized by analysis of bus travel performance and traffic volume.
5. **Depot Management System (DMS):** Allocate and optimize crew and overall bus operations by automating the management of vehicles, fuel, inventory, personnel, and vehicle maintenance.



Data from each service is collected and analyzed uniformly in a command control center against key performance indicators to create more efficient and dynamic bus service operations, and a smarter, safer travel experience for commuters, across the ticketing, in-station and in-journey stages.

“The comprehensive system offers the operator a plan-do-check-action optimization cycle that not only executes specified plans but also evaluates those plans by visualizing operation performance. Real-time visualization of running buses and fare revenue enables operators to easily detect irregularities and swiftly determine countermeasures,” explains Fujii.

Incident management systems also enable operators to track incidents such as equipment failure and bus accidents throughout the incident lifecycle.

“The infrastructure development and information obtained has been great. The one-touch ticketing with no human interface is easy for commuters to use, and we gain precious information on ridership, proper running of services, fleet management, optimum bus allocations to popular and less popular routes, and more,” says Shankar. “The system is already earning acclaim in this country for its proven success. To partner in this is a win-win situation offering added value for all.”



Results

Ahmedabad ITMS success, a template for successive smart cities

Launched in 2017, the intelligent transport management system is already helping develop efficient and convenient bus transport services, and transform Ahmedabad into a world-class smart city.

“This software-based system enables us to remunerate service contractors using concrete parameters such as total kilometers driven, driver behavior, safe driving, route adherence. New scheduling systems are already generating sizeable monthly savings,” says Shankar.

SCADL is now looking at developing multi-modal travel services spanning BRT, metro, railway, monorail, taxis, etc. and offering seamless services supported by integrated operation and ticketing platforms. Shankar believes,

“NEC has depth, tremendous transport products and experience of complex projects in Tokyo and elsewhere. It can invite the other 99 Indian smart city candidates to witness the success of the Ahmedabad ITMS, and extend it.”

Both partners share the same fundamental measure of that success.

“Throughout this project, NEC Technologies India orchestrated a group of 20 vendors and partners scattered worldwide because our primary motivation is to build synergies, and leverage our transportation solutions portfolio and ICT to create advanced social infrastructure, and improve India's society,” states Fujii.

For Shankar: “With the systems now in place, our citizens' personalities can bloom, and they can become the best they can be. We are proud to run a system like that.”

