

Use of video from Axis cameras supports safe urban planning in bustling Roppongi.

Smart streetlights measure people flows while deterring crime.



Organization:
Roppongi Shopping Street Association

Location:
Roppongi, Tokyo, Japan

Industry segment:
Retail (shopping association)

Application:
People counting, safety and security

Axis partners:
NEC Corporation, NEC Solution Innovators, Ltd.

Mission

Among the bustling crowds of the cosmopolitan and fashionable Roppongi shopping district, traders were seeking effective methods to attract customers and increase sales with the objective of extending the revitalization of the area while improving safety further. They had come to the conclusion that they wished to use video analysis technology to visualize visitors to the district, but this gave rise to privacy problems. A lawyer with experience in this area provided an introduction to NEC Corporation (NEC), from which they sought advice on technology and privacy issues. This resulted in the decision to update streetlights and security cameras to simultaneously accomplish the two objectives of analyzing data in order to generate activity on the streets, and maintaining safety and security. This in turn required a completely new concept appropriate to the sophisticated nature of the Roppongi area.

Solution

One of the solutions born to fulfill these requirements was the concept of the smart streetlight.

Installing smart streetlights that bring together multiple functions such as LED lighting, communications equipment, cameras, speakers, and signage, allows image analysis technology to be applied while deterring crime and counting people. The image analysis technology used is FieldAnalyst from NEC Solution Innovators, Ltd. which automatically detects faces and individuals, and infers characteristics such as age and sex. AXIS Q3518-LVE Network Camera offers a multi-view streaming function that enables one camera to view two different viewing areas, with wide-angle images being used for crime prevention applications, with extracts maintaining sufficient resolution for use in image analysis. The project was implemented with full respect for privacy, based on trials conducted with NEC.

Result

Using image technology on video obtained from the cameras enabled the movement direction and attributes of visitors (sex, age), as well as the number of visitors, to be analyzed in real time, 24 hours a day.



Currently, around two and a half years (including the trial period) of data has been accumulated, and the data inferred from this are proving useful as a foundation for investigating measures to attract customers and increase sales. The persuasive powers of the data have also been used during negotiations with authorities.

Going forward, there are plans to use signage to convey information that varies in accordance with the pedestrian attributes inferred, and to link with speaker equipment to attract customers. Urban planning initiatives based on the utilization of this data are attracting attention from all quarters as a case study in implementing smart cities in partnership with local communities.

Background to system installation and related details

The Roppongi Shopping Street Association undertakes activities to revitalize the area with the aim of creating a safe, secure and lively urban community. The Association had wanted to visualize the flows and attributes of tourists visiting the area from both domestic and overseas locations, seeking to use the concept of "Art & Design" to attract more customers and further increase sales while taking into account the local cityscape.

Although it knew that analyzing video taken by cameras was an effective means of achieving this, there were concerns about privacy. The catalyst for this project was a lawyer's introduction of the Association to NEC, which had from an early stage been developing image analysis technology for such data, and which was knowledgeable regarding privacy problems.

At the same time, the decision had been made to move forward with construction work to extend sidewalks for the 2020 Tokyo Olympics, and to update existing streetlights with security cameras.

This led to a request for a completely new kind of street light that would symbolize Roppongi, and gave birth to the concept of smart streetlights as edge devices that bring together multiple functions, such as crime prevention and people counting.

"It wasn't actually the case that we were aiming for something like smart streetlights right from the start" says Yoshihiro Mizuguchi, General Manager of NEC's Tokyo Olympic and Paralympic Promotion Division. "I think it came about like this because when we submitted a proposal to the Roppongi Shopping Street Association in relation to their need to visualize their area, they accepted our point that the value lies in the part related to the use of data."

However, various difficulties had to be overcome before the concept could be implemented. The Roppongi Shopping Street Association and NEC worked closely together on the design and process for this unprecedented project, which required them to clear administrative and regulatory hurdles, one by one. The two organizations took advice from a variety of specialists in their search for solutions to privacy issues, and eventually convinced stakeholders by setting up a trial project.

There were also many technological issues to surmount. Due to the unconventional design of the streetlights that were chosen, the camera was incorporated within the body of the streetlight itself, which involved restrictions on the space. Initially, it had been thought that two separate cameras would be required, because the applications of crime prevention and people counting use different fields of view.

However, the Axis multi view function enabled a single unit to display both wide-angle views and high resolution images for analysis. In addition, due to the 4K camera recognition accuracy can be maintained for image analysis even when zooming in on parts of the image.



With regard to camera selection, the key was being able to take images with sufficient quality for analysis in a harsh outdoors environment characterized by combinations of light and dark, and in an area that is busy 24 hours a day.

After verifying that AXIS Q3518-LVE, which features Forensic WDR and Lightfinder functionality, was resilient to backlit environments while also being able to record images of sufficient quality in low light, the customer selected this model. Axis was involved in the project from the initial stages, and the customer commented that our support, including proposals that took specific usage scenarios into account, made a significant contribution to the successful realization of the project.

Currently, information on flows of people can be checked via the Internet at any time by the Roppongi Shopping Street Association, and monthly comparative data shared between the Association and NEC is also being utilized in various initiatives.

Today, with two and a half years of data having been accumulated, it has become possible to conduct analysis and forecasting of seasonal trends, year-on-year comparisons, and the impact of weather and events.

The use of facts rather than subjective impressions results in extremely persuasive material that has also played an important role during coordination with administrative authorities.

The initial deployment of 10 smart streetlights will be increased over time, and the Roppongi Shopping Street Association will continue to work with NEC on initiatives to make further use of the data derived from them. In addition to stimulating consumer behavior and attracting people into stores by displaying advertisements on signage that vary according to the attributes of the targeted visitor, there are plans for smart management such as alerts and warnings that pinpoint specific areas using speakers.

Although there is currently a move by various regions to look at the utilization of data, it is thought that there are no examples of such a close community relationship. "Our objective is to establish how we can best use the data to support the energy of the area, while at the same time improving efficiency," says the NEC's Yoshihiro Suzuki.

It is hoped that going forward the Roppongi shopping district will become a model case for smart urban planning that adds safety and security to programs of regional revitalization.

"The biggest advantage is that we are now able to objectively see in numerical terms the attributes and the numbers of visitors that we had until now perceived only in sensory terms. It has also proved to be a persuasive set of data on which to base coordination with urban planning and traffic authorities, and those involved in construction work."

Chairman of the Roppongi Shopping Street Association.



Smart streetlights designed by Motoko Ishii and Akari-Lisa Ishii.

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