

At Infosys, a 'Live Lab' RFID App Eases Parking

At its main campus in India, the IT services company designed and deployed a vehicle access-control system using EPC Gen 2 passive tags.

By Mary Catherine O'Connor

Feb. 22, 2007—Some 800 employees of information technology consulting and software services company [Infosys Technologies](#) can probably afford to snooze in the morning for just a few extra minutes, now that their employer has deployed an RFID-based parking system at its main campus in Bangalore, India. That's because cars no longer have to queue up outside the five-level parking garage at the start of each workday, explains Girish Ramachandra, delivery manager for [Infosys RFID Solutions](#).

To enter the garage, each employee used to stop the vehicle, roll down a window and wave a personnel badge, which contains a low-frequency HID RFID transponder, in front of a reader near the gate. Once the system verified the employee ID encoded to the card, the gate would lift. During the morning rush, those steps led to backups that, on occasion, extended out to the street.

To alleviate this problem, and also to help employees find parking spaces once they entered the garage, Infosys installed a combination of ultrahigh-frequency RFID tags and magnetic sensors. Now, interrogators detect RFID tags embedded in windshield stickers attached to employee cars from as far as 3 meters in front of the gate. The readers send each tag's unique ID number to a middleware layer, which verifies that the employee associated with that ID has access to the garage. The middleware then sends a trigger for the gate to lift.

Each time a car drives onto one of the parking levels, a magnetic sensor embedded under the entrance sends a signal to middleware that is part of a device-management and decision-making engine designed by Infosys for the application, just as an identical sensor embedded under the pavement leading off the parking level does. The middleware keeps track of the number of cars driving onto and off each level. When a given floor reaches its capacity for cars, the middleware triggers a "level full" message to appear on displays positioned before each level entry.

"We looked at several options," explains Ramachandra, in regard to designing the system. While active (battery-powered) tags would have provided a long read range and good readability despite the metal in the car frames, such tags would also have broken the budget. "We needed an economically viable system," he says, "and active tags are too costly for this application." Active tags run from \$15 to \$20 apiece, and usually require readers that support a proprietary air-interface protocol. Passive UHF tags embedded into windshield stickers, on the other hand, cost around 30 cents each.

Infosys engineers went to work testing a number of passive tag and reader combinations and configurations before finding one that works well. Ramachandra says Infosys wanted to use hardware compliant with the [EPCglobal](#) Gen 2 standard for UHF passive tags to ensure interoperability and easy replacement of tags or readers in the future. Infosys is using a [ThingMagic](#) Mercury5 interrogator to read the tags. The RFID-enabled windshield stickers have been provided by [Printronic](#), and while they do not contain specialized,

metal-friendly tags, he says, they can be read easily because of how Infosys engineered the antenna arrays over the entrance gates.

Not all Infosys employees who park in the garage are being issued windshield stickers. Those visiting from other office locations, for example, must still use their low-frequency identification badges to access the building. The device-management and decision-making engine, therefore, needs to be able to process the inputs of the HID readers, along with the UHF tags and magnetic sensors. It must also orchestrate multiple events—such as controlling the gate and message boards—taking place in real time.

This parking garage system is significant to Infosys not only as an end user benefiting from better traffic flow and garage utilization, Ramachandra explains. It has also provided the company a blueprint for an RFID-based system it can deploy for its clients, either as a parking management solution or for different applications, such as yard management.

Designing and deploying the RFID system onsite provided Infosys with what it calls a "live lab" environment, in which it can put systems to test in a real-world environment. "We initially did a small pilot with 100 cars, testing the readability of the [windshield] tags in different conditions, such as heavy rain, to see if the humidity would impact their performance," he says. Neither humidity nor the intense heat generated inside a car parked outside on a hot Bangalore day, Infosys learned, had any negative effects on the tags.

RELATED_ARTICLES The company uses this live lab approach to help it prove the impact of the other systems, both RFID and non-RFID, aimed at business process improvements, that it pitches its clients. "When prospective customers can see us actually using what we are selling," says Ramachandra, "that helps."

Infosys is also testing other RFID applications at its Bangalore campus, including a system for using RFID to help merchandize products at a retail store at the site.

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