

Remote Surveillance & Verification Platforms (RSVP)

Leveraging your security, access control, and building management infrastructure with autonomous mobile robots

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Introduction

While "cute" may be somewhat applicable, it's too powerful to be a toy and it's definitely not a gimmick. This is the real deal. A true, fully autonomous, mobile robot designed specifically for the security marketplace. The PatrolBot and derivatives are a family of remote surveillance and verification platforms (RSVP) marketed under the brand RoboSentry™ introduced by Cypress Computer Systems, Inc. in a partnership with MobileRobots, LLC.



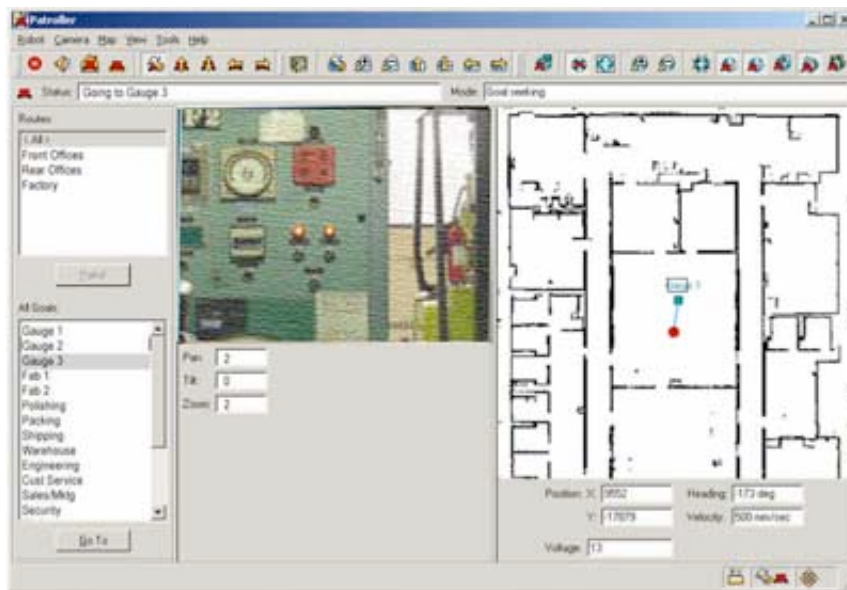
The big difference

What makes the RSVP series different from previous attempts to introduce robots into the marketplace? Cost, intelligence, and power. A price well under \$50,000 makes them affordable to more than just the Fortune 500 or universities. They do indeed navigate thru their environment using their on-board embedded controllers and no communication is necessary to a "central" computer for normal operation. Thanks to recent advances in batteries and power management, 24x7 operation is possible with acceptable duty cycles. And yes, the RSVP will find its docking station and automatically recharge itself.

Laser Mapping and Localization

The RSVP uses the same method of navigation and localization as do humans and other mobile life-forms. We all know what navigation is but the localization problem has been a tough nut to crack for robot researchers over the past 30 years. "Where am I?" is a question we humans can usually answer quickly with a little bit of information and contextual processing. Robots and computers on the other hand, while good at repetitive tasks, are

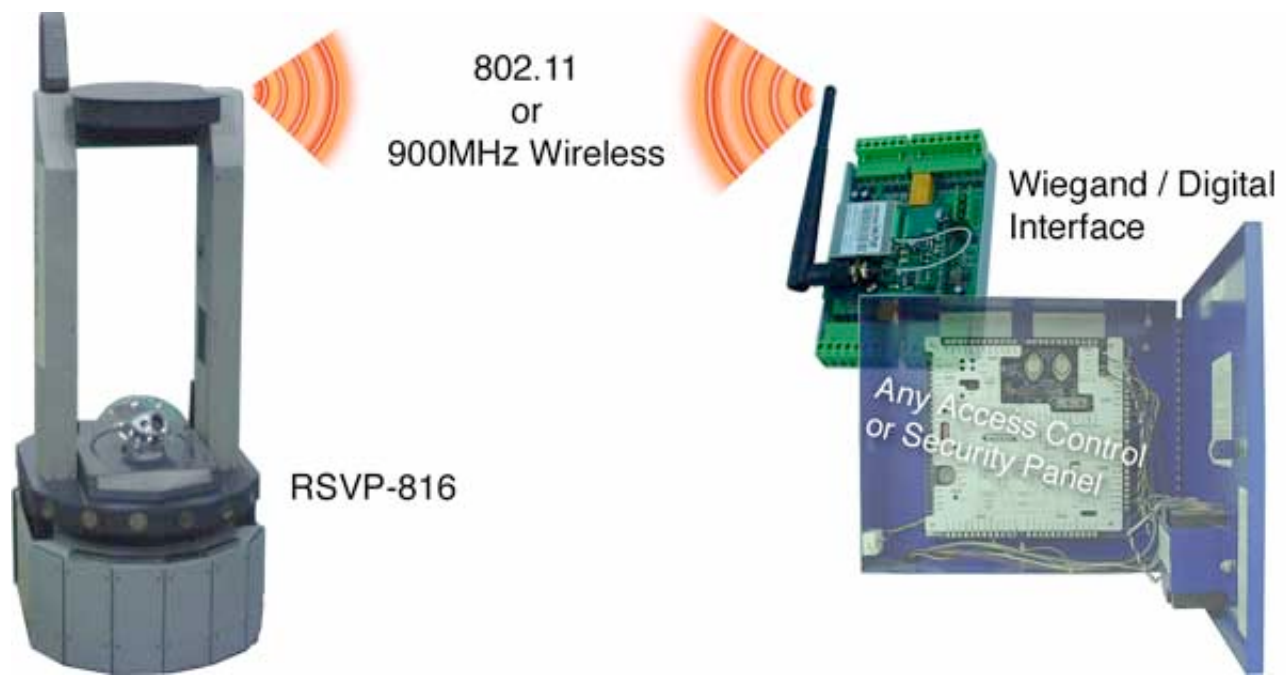
terrible at object recognition and contextual processing. Given an apple, a book, and a wrench, a computer will have a tough time distinguishing one object from another in a random setting. But like its biological counterparts, the RSVP does create a "world map" in its mind. It quickly scans and learns where static objects are, like walls and doorways, and creates a map of the environment from the robot's point of view.



While it can avoid bouncing off the wall or running into a person, a human must decide for the robot what areas of the map are important to avoid and to set its boundaries and goals. The RSVP's main task is to autonomously navigate to a goal once the command is given. The command can be manually issued (go to the last room on the left) or automatically generated (time to recharge, go back to the dock) or given by a linked system (fire detected at location B-12, go investigate).

Integration

SUPREX®Technology pioneered by Cypress and refined over the last 20 years, enables mobile robot platforms such as the RSVP to be easily integrated into any security, access control, or building management system. For example, an alarm generated by the fire system can command the RSVP to investigate. In doing so, the robot needs to call the elevator through the building management infrastructure to get to the 3rd floor. Upon arriving at the destination, it sends video, audio, and sensory information back to the operator. Onboard flame and smoke detectors register positive results, i.e., this is not a false alarm. Upon command (or automatically), the RSVP releases the CO2 suppressant and audibly alerts evacuation tones or phrases. It also provides a beacon for fire-fighters to locate the fire. After a hard day of fire fighting and heading back to its recharging station, the RSVP encounters a moving object in a previously defined "restricted" zone. It approaches the person and audibly asks for ID. The person must present his credentials to a card reader mounted on the robot, then the Wiegand (or any other format) data is sent to the access control system. An access granted signal is sent to the robot, it politely excuses itself and proceeds to the original goal. Otherwise, it sends an intrusion signal to the security system and sounds a local annunciator.



Communication

Command, control, and monitoring of the RSVP is done via 802.11g wireless ethernet. It can co-exist on a building LAN or be given its own dedicated channels. Other than video, the bandwidth needed for normal operation is negligible. The robot only needs to receive override commands and report status over the wireless link. Depending on the camera system used, bandwidth can be an issue on a non-dedicated LAN but so is the case with any stationary camera system.

Vision

The autonomous platform isn't aware that it has a camera; it isn't used for navigation but rather for the "verification" or "reconnaissance" function. The human operator can monitor the RSVP in real time with 802.11g link to the camera. PTZ or 360° lenses with anti-warping software provide remote surveillance. Any camera system can be used to integrate to existing security monitors.

Guard Tours and Alarm Verification

At the ISC East show in NYC, someone commented that this is the "perfect third shift guard tour solution". Robots are good at repetitive tasks and not deviating from the routine. Humans, on the other hand, are good at handling the exceptions. The RSVP can leverage any guard service by patrolling relentlessly and detecting things like smoke, CO, propane, UV, IR-motion, water and reporting the exceptions to the operator. Security officers are dispatched to evaluate and handle the situation.

Alarm verification is another problem that has plagued the industry forever. Finally, a practical solution can be applied to independently confirm the alarm status. In large manufacturing plants, millions of dollars of productivity are lost per year due to false alarms. This is one way to reduce or eliminate them.

Emergency marshalling points are usually set up in large plants for employees to gather

when sirens or tones indicate fire or severe weather. The RSVP can be commanded manually (or automatically) to one of these points. Its onboard card reader is used to log-in the employees present to make everyone is accounted for.

Visitor Escort and Inventory

OK, despite my initial statement, robots ARE cool! What better way to convey your company's leading edge character than by having robotic visitor escorts and kiosks in your lobby? One version of the RSVP has a touch-screen LCD for viewing information or teleconferencing. Again, by using Cypress' SUPREX®Technology, visitors can be monitored using RFID tags and be integrated into the access control and security system.

By using long range passive RFID tags from companies like Transcore, the RSVP outfitted with a tag reader can be sent into a warehouse to walk the aisles and collect inventory information. Taking this to another level, the robot can make nightly rounds collecting asset information in an office environment. Nothing is better than a robot for unfailingly performing boring and repetitive tasks!

Summary

No doubt some sci-fi flick with a "Robot Gone Mad!" theme has drifted through your mind, and yes, we could make dangerous robots. We could also make dangerous toasters but we choose not to. The RSVP is a new tool and, like any other tool, can be mis-applied or mis-used. But Cypress is dedicated to providing the platforms, training, and support to ensure successful integration of this new technology into existing and new installations. The next few years should be an exciting time in our industry as we perfect the technologies we pioneered in the last century.

I've been patiently waiting a long time for the embedded systems, power management, and cost to converge to make a practical robotic solution possible. I was 10 years old when men first landed on the moon in 1969. We were promised flying cars, moon bases, manned planetary exploration, and robotic assistants by the year 2000. Well, at least we have the robots now....