

My Partner the Robot - A New Law Enforcement Staffing Option?

By Carolin Larson

Do you ever wonder what the police department of the future might look like - specifically what law enforcement employees will look like and where they will come from in 15 or 20 years? It's not as easy as it once was to find people interested and qualified to work in the policing profession. These days, departments nationwide compete for a limited number of candidates to fill their ranks. With factors such as population growth, early retirements, increasingly technical and sophisticated criminals, increased public service demands and the call for more police and accountability, it's not going to get any easier.

Up to now, the answer to staffing shortfalls has typically been to come up with ways to creatively rearrange deployment schedules with existing personnel, back fill vacant positions with overtime coverage, hire back retired folks on an as-needed basis, or establish limited-duty positions to enable those recovering from injuries to return to work until they fully recover. For law enforcement to adequately staff their organizations, and continue to provide top quality services to their communities, more innovative and even *alternative* staffing options are available and should be considered.

While agencies work to develop new and more attractive recruiting and retention strategies directed at human resources, they may do well to also consider the not-so-distant future option of filling positions with alternatives such as humanoid robots. Robots have already been used to provide basic customer service in some private sector

organizations, even to give directions to those entering the business seeking assistance. Although less autonomous robots have been used for tactical and high-risk duties in law enforcement, the use of humanoid robots for non-critical, administrative duties (such as the front desk in police agencies) is an as yet unexplored viable and desirable alternative.

Recruiting and Retention

Think about it for a minute. Industry wide, the police are increasingly faced with having to come up with creative ways to staff their organizations. For decades, recruiting personnel into law enforcement was not much of a challenge. Departments used to comb through hundreds of quality applicants competing for a limited number of positions.¹ Today, however, law enforcement agencies are having difficulty even attracting people to the profession. "We're having a hell of a time," said Sgt. John Urquhart, spokesman for the King County sheriff's office in Seattle. "Police work doesn't have as much as allure as it did 10 years ago. ... Take your pick. Pick your reason."²

In nearly 22 years on the force, Lt. Tammie Hughes of the Dallas Police Department has arrested bad guys, investigated problem officers and helped prosecute crooked cops. But the difficulty of those jobs pales to her current job: recruiting new police officers for the

¹ "Using Visual Technology for Recruitment." Gene Ellis et al. January 2005 issue. Accessed July 27, 2005 at www.policechiefmagazine.org

² <http://www.policeone.com/police-recruiting/articles/123054/> accessed May 30, 2006.

Dallas Police Department. "I didn't realize that it was this hard," said Lt. Hughes, the recruiting unit's commander. "You can see an applicant come through the door, and they look like they have so much promise. Then all of the sudden, we find something in their background. We hired less than 10 percent that applied last year." ³

The difficulty of retaining personnel in today's police departments, in both sworn and non-sworn positions, can be attributed to factors such as unexpected career-ending injuries, attractive early retirement packages, employee misconduct resulting in disciplinary terminations and the aging workforce. About 76 million baby boomers, or those born between 1946 and 1964, are set to retire in large numbers by the end of the decade. Boomers make up about one-third of the U.S. workforce, and there aren't enough younger workers to replace them. Labor shortages in key industries will force a radical rethinking of recruitment, retention, flexible work schedules and retirement.⁴ From necessity comes innovation; the question arises, is there a better way?

The Story of Ms. Fuller

Let your imagination wander into the not so distant future... Ms. Williams came out to her car to go to work and found someone had broken the driver's side window, entered and stolen her palm device from the center console. She could have screamed. She knew from friends and family, insurance company ads and warnings in the local

³ Ibid.

⁴ http://www.forbes.com/careers/2005/09/28/career-babyboomer-work-cx_sr_0929bizbasics.html accessed 5/30/06.

paper's crime updates not to leave valuables in plain sight. She had just learned another very expensive lesson.

She knew a police report would be required before her insurance company would agree to cover the loss. Luckily, she had opted for the low deductible rate, so at least the insurance company would pay for most of the damage. Ms. Williams had to get to work soon, and wondered how long it would take to make a report if she just drove to the police station on her way to work.

She found a parking space not far from the police building entrance. As she entered the lobby, she immediately recognized the new addition behind the front desk from its photograph in last week's newspaper. She recalled the article talked about a program the police department was implementing using robots to staff the front office counter. "This could be interesting..." she mused.

Ms. Williams walked to the front desk and was intrigued by the pleasant greeting from the "woman" behind the counter. "Ms. Fuller" (identified by the name on her nametag) said with a smile, "Good morning, may I be of service?" Ms. Williams hesitated a moment, then began explaining what had happened. Ms. Fuller immediately understood the situation and asked Ms. Williams if she would like to have a police report completed to document the damage, and have the car dusted for possible fingerprints.

Ms. Williams accepted the offer of a report, and declined to have the car dusted for fingerprints as she did not want to deal with the clean up. Ms. Fuller explained the benefits of having the fingerprint dusting process conducted, but Ms. Williams declined and simply

desired documentation of the incident for her insurance company. Ms. Fuller proceeded to ask questions and both digitally and video record the information given by Ms. Williams concerning her car break-in. Once the information-gathering was complete, Ms. Fuller explained the fee payment process, directed Ms. Williams to the kiosk across the lobby, and instructed her how to obtain a printed copy of her report. Ms. Williams thanked Ms. Fuller for her assistance and walked across the room. Ms. Fuller then greeted the next customer...

The police department's robot staffing program had been in full implementation for six months. Ms. Fuller had once again fulfilled the department's expectations of performance in efficient customer service, especially because she freed others for more pressing duties.

Relating Ms. Fuller to Real Life

Sound far-fetched? Don't dismiss the concept just yet. The idea of using robots to staff personnel functions in a police station is not as far off as you may think. Remember the movie *I-Robot*, loosely based on the 1950 book of robot short stories by Isaac Asimov?⁵ As you may recall, in that movie, robots were common assistants and workers for their human owners.⁶ In real life in 2006, "humanoid" robots exist that are able to sense, actuate, plan and control. They are created to imitate some of the same physical and mental tasks that humans undergo daily, and are showing great promise in roles similar to Asimov's assistants of the future.⁷

⁵ <http://www.asimovonline.com/> accessed 4/21/06.

⁶ <http://www.imdb.com/title/tt0343818/plotsummary> accessed 4/21/06.

⁷ http://en.wikipedia.org/wiki/Humanoid_robot accessed 5/6/06.

In case you are wondering, a humanoid robot is a robot with its overall appearance based on that of a human body. In general, they have a torso with a head, two arms and two legs, although some forms of humanoid robots may model only part of the body (e.g., from the waist up). Some humanoid robots may also have a 'face,' with 'eyes' and a 'mouth.' According to www.wikipedia.org, the timeline of humanoid robot design and experimentation dates back to 1495 with Leonardo DaVinci's automaton armored knight.⁸ See what I mean? We're actually going backwards toward the future!

What Exactly Would a Robot Do?

Scientists and specialists from many different fields, including engineering, cognitive science and linguistics, are combining their efforts to create a robot as human-like as possible. The goal for those imagining the robot of the future is for them to understand human intelligence, reason, and act like humans.⁹ Some of the capacities of a humanoid robot may include:

- o Self maintenance (recharges itself, swaps batteries...)
- o Autonomous learning (learn or gain new capabilities without outside assistance, adjust strategies based on the surroundings and adapt to new situations)
- o Avoiding harmful situations to people, property and itself
- o Safe interacting with human beings and the environment¹⁰

⁸ Ibid.

⁹ http://www.wikipedia.org/wiki/humanoid_robot accessed 4/18/06.

¹⁰ Ibid.

While the concept being discussed here is the use of robots specifically for customer service at the front desk, their utility could potentially be expanded to similar capacities in other areas of the police department such as the Records Bureau, Community relations, and the Traffic Services Division, all of which may involve a level of one-on-one customer interaction. With appropriate implementation and oversight, robots could be programmed to provide efficient, reliable and consistent service at any public venue where people first come into contact with the police.

Capabilities may be programmed to include such things as collecting and exchanging information in person and over the phone, providing directions, producing documents, taking messages, and communicating with other department personnel. These tasks are included in those currently performed by human employees when assigned to a customer service position. Imagine the efficiency and precision that can be achieved in the police department of the future where cutting-edge robotic staffing is implemented to handle these standardized tasks, enabling human employees to be deployed to more critical roles.

What Will The New Guy/Gal Look Like?

For some who have been around a while, their vision of a robot might look something like the one in producer Irwin Allen's classic 1960's television series *Lost in Space* played by actor Bob May. "Robot," as he was called, was an "environmental robot," that looked

nothing like a human, yet he spoke and moved about among the group with whom he was marooned in space.¹¹ Others may picture "R2-D2" in the 1977 movie *Star Wars*, created by George Lucas. R2-D2 is the favorite robot of generations of Star Wars fans. He was a combination of the most desirable attributes of synthetic creatures as well as those of a perfect servant.¹²

While these are imaginary characters created by Hollywood, real life robot technology is taking the world in new directions each day. So far, robots have been used in many applications including the space program, military surveillance, automotive manufacturing, law enforcement tactical operations, ATMs, and medicine to name just a few. And now, robots are being taken to an entirely different level to perform more human-like functions and interact as partners or companions.

Social Robots

Both younger and older generations are becoming familiar with recent developments such as Honda's Asimo. Asimo is a humanoid robot which features the ability to pursue key tasks in a real-life environment such as an office and an advanced level of physical capabilities.¹³ Honda is also pursuing a greater challenge in robotics -- the development of a two-legged humanoid robot that can walk. Honda

¹¹ <http://www.lostinspace.com/news/history1.html> accessed 5/1/06.

¹² <http://www.robotohalloffame.org/r2d2.html> accessed 6/19/06.

¹³ <http://world.honda.com/ASIMO/> accessed 5/1/06.

wants to create a partner for people, a new kind of robot that functions in society. ¹⁴

Valerie

In quite a few innovative organizations (primarily research institutions and universities), robots are being developed to interact with humans on more equal terms. They have been programmed to perform a multitude of communication and practical tasks, even to perform tasks formerly assigned to their human counterparts. Examples among those that may be considered for customer service positions in the policing profession include "Valerie," the robot receptionist created and 'employed' in the Robotics Department at Carnegie Mellon University (CMU).¹⁵

Valerie is part of the Social Robots Project; the product of an interdisciplinary project between members of the Robotics Institute and the Drama department at CMU. The goal of the Social Robots Project is to overcome the human-robot social barrier. Towards this end, The Robotics Institute is developing a robot which "bears a personality," and which can behave according to social conventions. The idea is that communication and interaction with robots should be easy and enjoyable, both for unfamiliar users and trained professionals. They

¹⁴ <http://world.honda.com/ASIMO/history/> accessed 5/1/06.

¹⁵ <http://www.cs.cmu.edu/afs/cs/project/robocomp/social/www/goals.html> accessed 5/16/06.

want robots to behave more like people, so that people do not have to behave like robots when they interact with them.¹⁶

Social Robots - An assistant who is always helpful?

With the continuing computerization of the workspace and home, many people are looking toward the ease of interaction between humans and computers. The researchers at CMU, however, believe making the process easy is not enough; it should also be enjoyable.¹⁷ The Social Robots Project seeks to produce a robot helpmate that is useful, exhibits social competence and remains compelling to interact with for an extended period of time. In addition to helping people by providing information about CMU and directions to people's offices, Valerie is a character whose story is revealed over time through her interactions with people and phone conversations with her 'friends and family.'¹⁸

While robot Valerie performs tasks that only humans once did, she is a version that still appears more computer-like than human. She has a computer body, and a pleasant face displayed on a monitor atop the frame of the automated "body." There are other humanoid robots, also sometimes referred to as androids, whose appearances are actually very close to that of a human, which are in experimental use in other organizations.

"Ms. Saya," for instance, sits at the reception desk in the Tokyo University of Science, and very much resembles a woman. She offers

¹⁶ Ibid.

¹⁷ <http://www.cs.cmu.edu/afs/cs/project/robocomp/social/www/goals.html> accessed 5/16/06.

¹⁸ http://www.ri.cmu.edu/projects/project_523.html accessed 5/3/06.

greetings, and answers questions posed by visitors. Some scientists are calling the wave [of robots] a technological force poised to change human lifestyles more radically than the advent of the computer or cell phone ¹⁹ Consider for a moment how Valerie or Ms. Saya might be employed in your agency to fulfill some of the "routine" tasks humans might find boring or repetitive.



Cyber-receptionist Ms. Saya greets Hiroshi Kobayashi, her inventor, at the Tokyo University of Science. "She has a temper," the professor cautions. (Anthony Fiaola -- The Washington Post)
²⁰

Program Impact

There are a number of indicators pointing to the viability of robots being available for "hire" in the not too distant future. Researchers are designing robots specifically to provide services and interact with humans on a daily basis, and the police-public contacts experienced in agencies across the nation are well within the performance capabilities of robots envisioned in the near future. Some, like Valerie and Ms. Saya, are already in service in this capacity at the prototype level. Others, even more sophisticated, have been designed and implemented since these were introduced. Just like

¹⁹ <http://www.washingtonpost.com/wp-dyn/articles/A5394-2005mar10/html> accessed 7/19/05.

²⁰ *ibid*

computers and other technology, developments and improvements in robotics are advancing each day.

The Potential Benefits

The benefits of using robots in lieu of humans in some customer service applications extend beyond simply increasing numbers of employees. Robots require no sleep, food, rest breaks, money, days off, employee benefits, or vacations. They will not become injured or ill, lose days of work, or require workers compensation coverage. They are also not capable of committing acts of misconduct or behaving rudely. They are, after all, machines. Aside from basic requirements such as, but not necessarily limited to, power, and possibly fuel, "intelligence" programming, connectivity to a computerized network, and routine maintenance and upgrades, robots should require very little attention in comparison with human employees.

While it will certainly take some getting used to for customers and other employees when they learn that police department front counter service is being provided by a human-like machine, remember that the response to Automated Teller Machines, (also a robotic application) was not much different. There was resistance to the concept of automating banking functions previously performed by human beings. Nowadays, most people can't even remember the last time they went inside the bank to interact with a teller.

Acceptance of such a drastic change may take awhile, but if it makes life easier, the current and future generations will look at this no differently than interacting with their palm device or even their personal home or office robot assistant. Along with efficiency

and quality, convenience and speed are essential to consumers today. The availability of robots for use as customer service representatives is an alternative already in place in some types of organizations, and is an alternative to be considered and explored by law enforcement as a viable option to the staffing dilemmas agencies face with the dwindling supply of personnel resources.

Experts Discuss Robot Staffing

In August 2005, a panel of experts convened to discuss the concept of implementing a robotic staffing program to provide customer service in the front office of the police department. The group was comprised of representatives from city government, public safety, information systems, computer technology, public relations, academia, labor and criminal law, as well as a robotics engineer from NASA's Jet Propulsion Laboratory.

The panel was told the intent of the robotic staffing program would be to address two primary goals: Provide additional staffing resources to augment what has become a limited workforce, and to deliver standardized, efficient customer service to the public. Specifically, they were asked to identify, prioritize, and discuss trends and events, both positive and negative, which could potentially impact this issue.

Several hours were spent discussing the feasibility of using robots to replace or supplement human employees in an office setting in law enforcement. Of particular concern to the group were the following two things: whether the robots could be depended on to respond appropriately to situations and provide accurate information

during interactions with humans; and, the overall reliability of the system in the event of a natural or man-made disaster.

The point was made that any technology can potentially fail given a sufficiently significant event, and contingency plans would have to be in place just like they are now. As far as reliability and accuracy, the extent to which the robots can be relied upon to respond appropriately to a given situation will depend a great deal on the level of sophistication and capability of their design and how well they are engineered to work with end users - law enforcement and the public.

To be successful, robots would need programming to respond to the gamut of possible scenarios human employees currently encounter when working in the customer service setting. It may even be necessary to assign a human in the area where robots are stationed in the event of an unexpected circumstance and to provide routine oversight of operations.

Another area on which the panel focused was the matter of fiscal impact to implement this program. Some members of city staff opined that the large amount of funding may reduce or replace the amount of funds available to be directed to other local government programs and resources. It was agreed that any large technology project is going to be costly. The panel also noted all new technologies are initially costly, but that those costs will drop once such systems become commonplace. They felt it would be no different for humanoid robots once such systems were in wide distribution.

Of course, it would be necessary to quickly determine if the benefits expected would outweigh the costs, or at the very least justify them over time. This would require an extensive analysis to examine such things as: the expected initial capital outlay, the quality and reliability of the technology, how much time and money would be saved as a result of its implementation, and the anticipated level of acceptance of the end users - the public and the employees - to the change.

Of particular concern to the labor law attorney in the group, and which was seconded by several others, was the thought of replacing human resources with robots. Not only would adding robotic employees be a considerable change to the organization's operations, there is the question of ethics with any change that can be perceived to have an effect of putting humans out of work. However, the group also acknowledged that an organization has the right to implement changes to address issues related to its future viability and sustainability. If an organization has the resources to implement robots capable of successfully delivering efficient and effective public service, this enables the organization to maximize its human resources and utilize them in other areas.

Ultimately, the group agreed it would be necessary to demonstrate to the community and city administrators via a study that implementing robots as alternative staffing would reduce human resource related and other recurring operating costs for it to be a practical endeavor. Robotic staffing has the potential, once the initial investment has been made, to save the organization money in the long term in staff

time, wages and overtime, and lowered consumption of employee benefits. These considerations would be balanced against the initial and ongoing costs of this radical move to alter the nature of police staffing.

Costs

The cost of early produced robots was in the hundreds of thousands of dollars, so only the largest manufacturing concerns could justify their use. *Decreasing productivity and increasing labor costs*, though, influenced corporate decisions to transition to robots. With the demand for robots increasing, more companies began to build newer and better robots and the *cost of robots dropped rapidly*. Today, industrial robots start at \$5000 and most robots can be purchased for less than \$100,000.²¹

In his January 2006 Forbes.com article on technology costs, titled *Buy a Robot and Save America*, Robert Mallone wrote on costs related to industrial robots. He pointed out that, while there is an initial purchase and installation cost of approximately \$60,000, this can be amortized in a few years. After that, the cash flow is impressive. In 2000, an individual robot cost one-fifth what it would have cost in 1990. The prices continue to drop, and some manufacturers and distributors have gotten the message.²²

²¹ <http://www4.district125.k12.il.us/Faculty/djohanns/techEdHomePage/InroRobots.html> accessed on 4/15/06.

²² http://www.forbes.com/logistics/2005/12/30/robots-logistics-warehouse-china-cx_rm_0103robots.html accessed on 6/19/06.

When considering the purchase of a large scale system, such as robots networked with the building's computer system and programmed to interact with humans in the delivery of customer service, it should surprise no one there are going to be many significant costs involved. The following is a simplistic, but organized list of the cost breakdowns separated into five categories: Capital outlay, Services, Operations, Training, and Replacement Costs.

The initial Capital outlay will include the cost of the equipment itself - the robots and associated hardware. Related program services will include system engineering, installation and project management. It should be noted the total cost for services in most projects of this extent usually meets or exceeds the capital outlay costs, especially when dealing with well known vendors of technology equipment.

Operations typically includes operating costs, including power and telecommunications fees, if any; maintenance, usually in the form of an agreement or maintenance contract; and consumables. An example of consumables is the normal wear and tear on robotic systems requiring the replacement of mechanical parts or other perishables.

Under the heading of Training would fall the costs of providing training on the system for everyone involved, as well as for staff time to attend. Replacement costs would require setting aside funds to replace the equipment after its expected life cycle. For example - if the plan is to keep the equipment for five years, about 20 percent of

the total capital outlay each year should be set aside to provide sufficient funding for equipment replacement.

While the types of robots that would be used to provide law enforcement customer service may differ significantly from those used in industrial manufacturing, the analogy can provide a frame of reference for cost adjustments over time. Also, the reasons many companies began automating their operations were rooted in some of the same reasons we may look to use robots as alternative staffing - increased costs of doing business, decreasing availability of personnel, and the need to provide higher quality service.

Not So Fast, Some Say

Along with those in favor of the development of innovative technological alternatives to address current and future needs, there are always going to be devil's advocates who question the viability of new concepts. And they should. Their objections and inquiries make us work that much harder to get it right.

"The next great consumer technology will arrive in the form of personal robots," says Ron Arkin a Regents professor in the College of Computing and director of the Mobile Robot Lab. "The innovations will be accompanied by a host of ethical concerns about human-robot interaction," adds Arkin, who co-teaches a course on robots and society with Charles Isbell, an assistant professor in the College of Computing. "Historically, technologists have been woefully ignorant of the implications of what they created," he says. "I would probably put myself in that category until a few years ago. Research and development will move forward, but we still need to understand what

the consequences are, then come to grips with them and determine whether we should do anything about them." ²³

Clearly so futuristic an idea, with so many social implications as using robots to staff areas in our organizations, is not to be delved into lightly. Robot staffing could only be implemented after a lengthy evaluation of its merits and cost to benefits ratio, and the assurance that it would be an overwhelmingly positive development for the concerned department, community and law enforcement as a whole.

Conclusion

While the research on the subject of humanoid robotics revealed the technology has advanced astoundingly in the last two decades, it may take some time before the model is developed that possesses the capabilities needed to staff a public service desk in a police department. That said the future may yet be upon us. As Robert Capps, writing for Wired Magazine wrote: "It was an astounding request. A year ago, neuroscientist Mitsuo Kawato called on the Japanese government to commit 50 billion yen (\$446 million) a year for the next three decades. The dream: an Apollo-like program to build a robot with the mental, physical, and emotional capabilities of a 5-year-old child. Kawato called his plan the Atom Project, named for the popular postwar cartoon *Tetsuwan Atom* (known as *Astroboy* in the US), the story of a superhero boy robot."²⁴

Today the Atom Project remains little more than an audacious proposal. But the science behind it is quite real. With each advance

²³ <http://gtalumni.org/Publications/magazine/spr05/article1.html> accessed 5/17/06.

²⁴ <http://www.wired.com/wired/archive/12.07/race.html> accessed 5/17/06.

in computing speed, battery capacity, camera and motor miniaturization, and software capability, the world grows closer to the ultimate goal of robotics: a walking, talking, feeling android worthy of our cinematic inspirations.²⁵

Consider the progress of just the past 15 years. There are now robots that can get around on two legs, participate in simple conversations, and manipulate objects in rudimentary ways. Of course, we don't yet have a bot that can navigate downtown Manhattan, tie its shoelaces, or even tell a chair from a desk. MIT's Cynthia Breazeal, however, holds out hope that within five years, robots will cross a critical threshold, becoming partners rather than tools - in other words, we'll have friends, not appliances. And while there are a number of extremely complex problems to solve before we can make something as advanced as Sonny, the star of *I, Robot*, we're getting there, one piece at a time.²⁶

Carolyn Larson is a Lieutenant and 24-year veteran of the Santa Monica Police Department. Carolyn is the Commanding Officer of Santa Monica's Communications Center, and while attending California POST Command College, is conducting research on the use of robot technology as an alternative staffing option in some areas of law enforcement.

²⁵ Ibid.

²⁶ Ibid.