

DANGER FLEEING SUSPECT; DANGER!

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The Command College Futures Study Project is a FUTURES study of a particular emerging issue of relevance to law enforcement. Its purpose is NOT to predict the future; rather, to project a variety of possible scenarios useful for strategic planning in anticipation of the emerging landscape facing policing organizations.

This journal article was created using the futures forecasting process of Command College and its outcomes. Defining the future differs from analyzing the past, because it has not yet happened. In this article, methodologies have been used to discern useful alternatives to enhance the success of planners and leaders in their response to a range of possible future environments.

Managing the future means influencing it—creating, constraining and adapting to emerging trends and events in a way that optimizes the opportunities and minimizes the threats of relevance to the profession.

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Danger Fleeing Suspect; Danger!

Much like the “Danger Will Robinson; Danger” warning by the robot in the 1960’s science fiction television series “Lost in Space,” to young Will Robinson of an impending threat; so too must we warn future criminals with designs on fleeing the police. The 60’s television version of the warning was packaged in an upright, two legged, metal skinned, slow moving, “Michelin Man” with a human voice and lots of flashing lights. Tomorrow’s version of the warning will look much different. When this version broadcasts its warning, it will bring with it capabilities far beyond a simple alarm. It will tote a variety of tools and weapons capable of neutralizing and subduing the criminals of the coming age. Although it may seem far-fetched to some, the police K9 program may be one of the first areas where we deploy robotic assistants in the field. Far beyond mere companionship, these “R9’s” will be able to perform with very similar outcomes to today’s K9 counterpart.

The Use of K9’s in Policing

The modern history of contention regarding the use of Police dogs in America began in the 1960’s (Rappold, 2003); examples of which can be found in the article, " Riots 'the language of the unheard,' a decade of police dogs and protests." Whether political, constitutional, or aesthetic, the concerns often pose valid arguments for those opposed to the use of K9’s. Politically, images of dogs unleashed under racially motivated circumstances during the Civil Rights movement of the 1960’s, often conjure up emotions within the community of storm trooper type repression. The Constitution also raises recurring issues dealing with search. Seizure and the use of force under color of authority as it relates to the 4th Amendment.

Ultimately, K9 use in its current state results in an aesthetic that is of major concern for the community and the police. It's hard to avoid the ugliness associated with government issued dogs biting citizens, regardless of the circumstances; resulting in K9 deployment become the "ugly necessity" in law enforcement. James Fyfe, professor at the John Jay College of Criminal Justice, and former New York City police officer who tracks alleged police misconduct nationally, is quoted in the an ABC News piece, entitled, "When Police Dogs Grow Too Vicious" as saying; "The police dog is a very valuable asset, but when they're misused, they're awful and like all weapons, their misuse can lead to devastating consequences." (ABC-Fyfe, 2012)

Today's police K9, as a biologic entity, has limitations. For example, it is subject to the flaws of its behavior, the breed's characteristics and the manner in which the K9's handler manages its actions. Those characteristics include, but are not be limited to; prey drive, temperament, personality, dominance, defense drive, play drive, learned behavior capabilities, and feral tendencies. This, according to Dominick Donovan of Working Dogs Cyberzine, in a piece titled, "The Components of Strong Working Dog Temperament," (Donavan, 1989) and Dave Reaver of Adlerhorst International, Police K9 Dog Training Academy, in the "Handler Development Course" training material. (Reaver) The fact these characteristics are unique to each dog means the approach to the each must also be unique. This requires continuous training for both the dog and the handler to maintain the desired operational capacity, and requires a relationship between the two that allows for the dog to submit to the handler with the expectation that in all cases the dog will perform as trained. Unfortunately, in this interaction, there are numerous synapses that must fire in the K9's

brain correctly every time if effectiveness is to be maintained. This puts the onus of outcome on two entities [dog and handler] that speak completely different languages, yet are expected to synchronize their behaviors to achieve the mission. Most often it works, but is always contingent upon less than controllable inputs.

A police dog must be trusted to perform out of view and far removed from the handler and any control elements.” (Reaver) Often, the only control mechanism is verbal commands, which means efficiency relies completely upon the relationship between the handler and the dog, and the dog's willingness to do as told. Not the most effective controls imaginable, but, there may soon be an alternative. Tomorrow's robot early warning? The R9 Police Robot Apprehension and Detection System.

From K9 to R9

Imagine a dog that always obeys, always performs exactly as intended, but needs no food, behavior reinforcements, or housing; and never gets tired, sick, or old. That dog is the R9. The robotic technology along with remote stand-off capabilities will be a completely integrated mechanism that may, or may not resemble a dog, but will mimic all the capabilities of a living canine without the limitations. It may be wheeled, legged, or capable of being either depending on the mission. In fact, in academic research involving, bio-mimicry as a tool in the design of robotic systems, Jason Fleischer and Wade Troxell, from the Department of Mechanical Engineering at Colorado State University, say, “it may also be possible to produce machines that are able to walk, that have no parallel to any natural species; unique unto itself” (Fleischer, Troxel).

There are many private companies and public entities working to develop next

generation, user friendly, robotics technology and, although the R9 may not hit the streets much before 2020, there are some current scientific efforts in the developmental stages involving robotics that show promise in a variety of areas. One that has direct implications for the conceptual R9 is the BIGDOG LS3 Robot from Boston Dynamics. As described by Boston Dynamics on their website in 2010, the BIGDOG is a rough-terrain robot that walks, runs, climbs and carries heavy loads. BIGDOG is powered by an engine that drives a hydraulic actuation system. Its four legs are articulated like an animal's, with compliant elements to absorb shock and recycle energy from one step to the next. BIGDOG is the size of a large dog or small mule; about 3 feet long, 2.5 feet tall and weighs 240 lbs. Its on-board computer controls locomotion, and handles a variety of sensors, keeping it balanced, as it navigates, and regulates its energetics under varying conditions (Boston Dynamics, 2009).

Another example can be found at the Georgia School of Technology where they have developed robots that mimic the relationship between humans and their service dogs. The robotic service dog can open doors, switch on lights, and perform other simple tasks as a much-needed lifeline to people with disabilities. They can be commanded the same way as a biological service dog, to grab hold of a towel, turn a doorknob, open a drawer, or cupboard when given the right vocal command (Grifantini, 2008).

With efforts like these, the future of robotics is bright. More specifically the future of the R9 concept may be realized, completely changing the face of police field operations. The technology is very promising, but as yet, does not demonstrate the dexterity or agility required for the R9 application. It is expected, however, that continuous advances in robotic technology from across the scientific spectrum will soon make it possible to meet

the operational needs. In fact, according to John Wray in his article, “50 Leading Robotics Companies to Display, Demo at U.S. Army “Robotics Rodeo” at Fort Benning, for the 2nd consecutive year 50 robotics companies were invited by the Army to give demonstrations of their robotics offerings at the well known Army Post in Georgia. (Wray, 2010) Events like this and developments such as BIGDOG are indicative of the efforts to move robotics forward and advance future applications, such as the R9.

Future’s Knock and Notice

The future is at the door and it comes bearing gifts. Imagine BIGDOG’s capacity blended with the attributes of the mechanical service dog under development at Georgia Tech. Imagine the dog, on its way to becoming an R9, can be programmed with limits on behavior, response to commands and specifics regarding the types of incidents and its most appropriate actions. Imagine also that the R9 can perform without rest breaks and with a reliable outcome each time it is deployed. Who will be the first Chief or Sheriff to unleash the R9? Which department will be the first to take advantage of the advanced robotic police dog that will boast capabilities far surpassing that of its biological counterpart, solving the many legal, aesthetic, and operational problems associated with the law enforcement service dog of today. Who will be the first to sleep better at night knowing that his or her reinvented police dog program has changed the game regarding efficiency and capability, while also nullifying the dreaded “L” word: Liability?

The potential liability associated with inefficient control mechanisms will be remedied by the R9. Because it will be completely controlled with built in redundancies, the R9 will never do anything it is not told to do, reducing the margin for error. Of course

human error will continue to be an unavoidable issue and there will still be exposure related to operator actions. However, as one might conclude, with the increased level of control along with added performance capabilities, the opportunities for best outcomes will conceivably be increased. With the advent of the R9, organic weaknesses would be designed out of the equation. Essentially, the robotic version affords the operator complete control of every aspect of deployment. It will do everything a police dog does and perform every role currently required and more. On command by wire, the R9 will guard and bark, bite, apprehend, locate, and detect just as today's K9 does, only using technologically advanced sensors and mission specific components, in place of the naturally existing physical and sensory components of dogs.

What Makes Spot Run?

The R9 should be heavy enough to intimidate and apprehend, while being light enough to afford the necessary agility. Constructed of materials and in such a way that it would be impact and ballistic resistant, keeping the most sensitive components such as power source, electronics, etc, protected. This should allow for durability and repair capability conducive to years and years of service that will far out last an organism that ages in "dog years." One might imagine standard components to include: cameras for eyes that relay a real time picture of the operational environment in a multitude of acuities including infrared, digital imaging, high definition, and 3D. It would transmit information back to the operator to be evaluated and acted upon via remote control. The mouth design could allow for offensive bite capabilities with teeth like components, or a ratcheted, smooth, vice like mechanism that allows the R9 to latch onto a limb without the tearing or

puncturing; much like a modern day handcuff on steroids. The mouth may might also house a communications system that allows the operator to speak directly to a suspect or other involved party, while also allowing the party to speak back to the operator. And, let's not forget the bark. It should have an ominous roar of a bark programmed in. The snout can house the olfactory mechanisms and sensors that measure the air relaying information back to the remote site where a processor analyses the information in hyper-speed and provides tracking or locating inputs that the system simultaneously acts upon. The tail would act as the antenna and environmental sensor that serves as the wireless conduit between the operator and the R9.

Unlike today's K9 version, the R9 will have the capability of being utilized in multi-role configurations, allowing departments to possibly reduce the number of R9's deployed, in relation to their current compliment of K9's. Where in the modern environment, dogs must be specialized i.e. one dog for narcotics detection and another for explosives detection, etc; future hardware and software applications will allow the R9 to switch roles on the fly based on the mission needs. This will be particularly important to larger agencies with numerous K9's as it is sure to mitigate their program costs and allow for swift adjustments in the operational arena that may lead to quicker apprehensions and faster incident resolution, all while keeping the operator at a safe distance but in complete control. Complete control is important because there are no truer words to describe the dominion and authority the operator will have over the R9 and all of its many facets.

To get there, the cost of research and development for the R9 will likely be high. In "DARPA's Robot Dog Projects," it was said that in 2009 DARPA (Defense Advanced

Research Projects Agency) awarded Boston Dynamics a \$32 million, 30-month contract to develop BIGDOG LS3 prototypes. (Defense Industry Daily, 2009) A high end investment to say the least, but, since there is no current comparable police application, estimating the true front end costs would be very difficult. When looking at other currently produced police and military service robots designed for bomb squads, and tactical weapons deployment, the cost of purchase generally varies between \$30,000 as with the Vanguard™ MK2 remotely operated vehicle, (Nat's Institute of Justice) to \$150,000 as with the Foster-Miller "Talon" Robotic Auxiliary Vehicles, (Army Guide) depending on size, features, and upgrades. Outside of R&D, and depending upon competition to market, the R9 unit costs are likely to be similar based on standard market cycles connected with the service robot industry. Additionally, there will be maintenance and repair costs, but with the anticipated extended operational life those costs could be comparable to the cost to obtain, train, maintain and deploy the police K9 of today.

The Future

The cop in control of this technology will be quite different than the handler of today, although laws pertaining to force are not likely to be much different and the mission of police dog teams will likely be similar. The operator will be more of an information analyst and technician, then the handler role calls for. The technology will require a level of hand eye coordination commensurate to that commonly associated with the military drone pilots in today's American armed forces, or more simply the everyday gamer sitting in front of a commercially available game console.

The essence of the R9 is a totally integrated human-machanical, or "humechanical" relationship between the operator and his or her robotic partner. It will bring to bear all the advantages of emerging technologies while eradicating all the limitations and harsh lessons learned over the years of K9 deployment. In this "dog-eat-dog" world, the evolution of anything eventually overtakes the revolution of everything. At one point in history, the use of dogs in police work may have been considered revolutionary. The next revolution may be almost upon us. As for bark vs. bite, the future will answer the question as to whether the R9 is the next thing in police dog evolutionary process.

¹ "Humechanical" is an original term by the author for this article.

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