Robot Dogs for Surveillance and Policing: Overview and Policy Recommendations

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EXECUTIVE SUMMARY

Long a focus of dystopian science fiction lore, the development, deployment, and utilization of robotic dogs has recently entered the mainstream, with a number of U.S. law enforcement agencies purchasing the technology and announcing early phase deployment for the stated purpose of aiding and abetting municipal law enforcement efforts. Sold to the public as part of a broader effort to incorporate advanced technology into governance in order to safeguard citizens, the technology raises core concerns around the growing trend of deploying mobile cameras and artificial intelligence (AI) to surveil and control the public.

This memo details the historical background and development of robotic dog technology, as well as its stated use cases and utilization efforts to date, both domestically and internationally. It goes on to explore the ethical concerns posed by robotic dogs and the public's opposition to this trend. This memo concludes with a number of policy recommendations to responsibly monitor and counteract expanded and potentially nefarious utilization of this technology by government and law enforcement.

BACKGROUND

Boston Dynamics

The company that brought the conceptual vision of robot dogs to reality is Boston Dynamics, an American engineering and robotics company. Today, the robot maker is valued at $1.1 billion.[1] Boston Dynamics' earliest forays into quadrupedal robotic technology were funded by U.S. taxpayer dollars. In 2005, "BigDog," the company's first four-legged prototype was created in partnership with NASA's Jet Propulsion Laboratory (JPL) through funding by the Defense Advanced Research Projects Agency (DARPA). With JPL's technology providing the "vision systems to guide the robot," BigDog was able to, "run at high speed and leap over comparatively large obstacles."[2] In the second phase of this project, the company developed "LittleDog," whose specialty was its ability to sense its surroundings, utilizing cameras and sensors to help it "see" obstacles and avoid missteps.[3]

Key Findings

The development, deployment, and utilization of robotic dogs for the purpose of law enforcement and public safety raises concerns about the use of artificial intelligence (AI) to surveil and control the public. These concerns warrant close monitoring and oversight by the public as well as civil liberties and Police/government accountability groups.

The wide adoption and integration of these technologies by state and local governments and law enforcement agencies does not appear to be imminent. While the robots may serve a unique purpose in high-stakes public safety situations like bomb scares and hostage situations, these events are extremely rare and do not warrant wide-scale procurement and deployment of expensive robots. Cost alone provides a strong reason for limiting the adoption of the technology by municipal bodies.

Policy recommendations include: Expand Community Control Over Police Surveillance (CCOPS) legislation in state and local governments and municipalities to increase public oversight of surveillance; pass federal legislation to regulate robot dog development and set guardrails for acceptable use cases; and ban the use of armed robot dogs.

Technology & Use Case

In 2019, Boston Dynamics began to make "Spot," its four-legged lightweight dog-like robot, available for commercial sale and use. Retailing for roughly $75,000 each, the robot is marketed mainly for use in industrial automation, autonomous and remote inspection, manufacturing, and warehouse operations. White papers have lauded the robot's ability to provide flexible autonomy on construction sites, automate thermal and industrial inspections, and gather reliable and repeatable data for predictive maintenance. Additionally, Boston

Dynamics has described how the devices can sync into a company's broader Internet of Things (IoT) ecosystem through real-time machine to machine communication, data transfer, and analysis.[4] In recent years, the company has negotiated several deals with large corporate customers interested in trialing the technology for use in their own industrial and manufacturing operations. Firms that have used Boston Dynamics' robots include pharmaceutical company Merck and oil and gas giant BP.[5] In 2022, Boston Dynamics reported over 1,000 Spot robots operating in 35 countries.[6]

The Global Market

The global inspection robot market is anticipated to rise at a considerable rate in the next decade and is expected to reach close to $14 billion by 2030, as a slew of competitors continue to develop their own technologies.[7] Numerous companies have been developing robot dogs to be deployed in the workforce and public sector for applications such as inspections, security, and public safety.[8] In addition to Boston Dynamics, some of the largest manufacturers of robot dogs include Spin Master, Sony Corporation, and Huawei.[9]

GOVERNMENT DEPLOYMENT—U.S. & GLOBAL

U.S. law enforcement agencies have in recent years zeroed in on robot dogs as a technological innovation that could enhance public safety. This is a shift from initial use case deployment in scenarios like industrial automation and increasing manufacturing efficiencies and is a notable development because of the way robot dogs combine autonomously mobile AI with video and audio surveillance.

New York City

In December 2020, the New York Police Department (NYPD) acquired one of Boston Dynamics' Spot robots, deploying "Digidog," as it was nicknamed, to help defuse what appeared to be a live hostage situation in the Bronx.[10] Following fierce criticism from members of the public, City Council, and several civil liberties groups, the contract—worth roughly $94,000—was quietly terminated on April 22, 2021.[11]

In April 2023, the program was revived with considerable fanfare in a public announcement in Times Square presided over by Mayor Eric Adams, himself a former member of the NYPD, who was elected, in part, due to concerns over crime. Adams announced the purchase of two robot dogs for surveillance purposes as well as additional supportive technology, for a sum of roughly $750,000, paid for through asset forfeiture funds, as part of an array of high-tech security devices that he claimed would make the

city a safer place to live and work.[12] "We are scanning the globe to find technology that will ensure this city is safe for New Yorkers, visitors, and whomever is here in the city," Adams said. "This is the beginning of a series of rollouts."[13]

Los Angeles

In May 2023, the Los Angeles City Council voted 8–4 in favor of approving a $278,000 "Quadruped Unmanned Ground Vehicle" manufactured by Boston Dynamics, despite some members' expressing grave concerns surrounding the technology.[14] The robot was offered as a donation to the LAPD from the Los Angeles Police Foundation. The LAPD is required to issue quarterly reports about the robot's usage and outcomes, as well as note any problems that arise.

San Francisco

In November 2022, despite vocal objections from advocates for expanding police oversight and upholding civil liberties, the San Francisco Board of Supervisors voted 8–3 to give city police the ability to use potentially lethal, remote-controlled robots in emergency situations. Although the San Francisco Police Department does not possess pre-armed robots, the policy allows them to deploy robots equipped with explosive charges, "to contact, incapacitate, or disorient violent, armed, or dangerous suspects," when lives are at stake.[15] Limits were placed on the policy, including requiring alternative means to be deployed prior and providing the authorization to deploy such technology to a limited number of high-ranking officials. In a statement to the *New York Times*, San Francisco Mayor London Breed wrote, "If the police are called to serve in a situation where someone intends to do harm or is already doing harm to innocent people, and there is technology that can help to end the violence and save lives, we need to allow police to use these tools to save lives."[16]

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Dubai

In 2018, Dubai Police displayed a "Home Security Smart Dog" prototype, developed in partnership with Innovation Kingdom, as part of the UAE Innovation Month. Weighing 35 kg, the Wi-Fi-enabled smart dog has a CCTV camera mounted atop, allowing it 360-degree views. Designed to secure homes and embassies, the dog transmits images directly to a homeowner or police operations room, has speech capabilities, and is equipped with a sound input device to allow it to understand human speech. Innovation Kingdom hopes to expand this project beyond homes and embassies to "secure communities as a whole." They aim to develop the ability to identify narcotics and utilize facial recognition technology to identify wanted individuals.[17] In 2024, Dubai Police Lieutenant Colonel Salah Al Mazrouei explained that they are still researching robot dog technology, as the current models have not yet reached the capabilities of traditional police dogs. For now, they have equipped K-9 units with cameras to enable real-time monitoring and data collection. Ultimately, they hope to continue developing these technologies to eventually deploy robot police dogs for hazardous or high-risk missions.[18]

China

China utilized their own version of Spot to enforce social distancing during the coronavirus pandemic in Shanghai. They used a swathe of robots to patrol city streets, coupled with drones in the sky, to enforce the 25 million-person metropolis' widespread mandatory Covid lockdown during the spring of 2022. The dogs, developed by Chinese drone company DJI, patrolled city streets and apartment corridors, commanding residents to stay inside, wash hands, check temperatures, and report for mandatory COVID testing.[19] Later that year, in a shift toward weaponization, private Chinese military defense contractor Kestrel Defense showcased the Blood-Wing—a robot dog mounted with a machine gun that can be transported via drone. In a post on China's Twitter-like Weibo platform on October 3, Kestrel lauded the advances in its hardware, detailing how, "The heavy-duty drones can deliver combat dogs, to be directly inserted behind enemy lines and spring surprise attacks on weak links. They can also be placed on the rooftops and work with troops on the ground to ambush enemies inside buildings."[20]

BACKLASH

Sensitive to the growing concerns from the public surrounding the ethical uses of artificial intelligence (AI), in October 2022, Boston Dynamics signed a pledge saying it would not support weaponization of its general-use products, calling for peers in the industry to do the same.[21] Joined by five other firms—Agility Robotics,

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ANYbotics, Clearpath Robotics, Open Robotics, and Unitree Robotics—CEO Robert Playter expressed concern about, "a small number of people who have visibly publicized their makeshift efforts to weaponize commercially available robots," and advocated for policy that prohibits bad actors from misusing it. The company went on to, "pledge that we will not weaponize our advanced-mobility general-purpose robots or the software we develop that enables advanced robotics and we will not support others to do so."[22] Significantly, they do not mention weaponizing other types of robots.

Despite the rise in concern over developing AI technology, to date, anti-surveillance legislation has failed to specifically address the use of police robot dogs. The American Civil Liberties Union (ACLU) has led the charge in pushing back against state and local governments' increasing approval and expansion of mobile video and audio surveillance technology by supporting the passage of "Community Control Over Police Surveillance" (CCOPS) legislation. The CCOPS campaign, launched in September 2016, works to pass laws that require police to broaden transparency into their adoption and use of surveillance technologies while ensuring that communities and city councils are empowered with tools to monitor and moderate such use. The ACLU reports, "To date, CCOPS laws have been adopted in 23 jurisdictions from coast to

coast, where they serve to protect and empower over 17.7 million people."[23]

The CCOPS effort has resulted in several notable successes, including a 2019 law banning the use of facial recognition technology in San Francisco, the nation's first such law, as well as the Public Oversight of Surveillance Technology (POST) Act, passed in New York in 2020, in response to efforts to overhaul what many called overly aggressive actions by the NYPD in reacting to the Black Lives Matter demonstrations that summer. POST, which passed by a vote of 44 to 6, compels the police to disclose the sophisticated surveillance technology used by the department and the data they collect on citizens.[24] In the wake of Digidog's reinstatement this past April, the Legal Aid Society accused Mayor Adams and the NYPD of failing to properly disclose how the robot dogs will be used and sent a letter to the NYPD's inspector general requesting a probe of the department's compliance with the POST Act.[25]

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ASSESSMENT

While the rise in autonomous robot dogs is a cause for concern, their utilization and deployment by governments and law enforcement agencies in the U.S. appear to be piecemeal to date. Apart from several trial periods and small-scale controversial purchases by municipal agencies and police departments, the wide adoption and integration of these technologies by state and local governments and law enforcement agencies does not appear to be imminent. However, the continued adoption of the controversial technology raises concern, due to several issues, and thus warrants close monitoring and oversight by the public as well as civil liberty and police/government accountability groups. The continuing expansion of CCOPS legislation across the U.S. is a good start to broaden public awareness and demand accountability from municipal governments

and law enforcement agencies regarding surveillance and the use of taxpayer money to pay for it.

> **The continued adoption of the controversial technology raises concern due to several issues and thus warrants close monitoring and oversight by the public as well as civil liberty and police/government accountability groups.**

Cost alone provides a strong reason for limiting the adoption of this technology. At roughly $75,000 per device at the minimum, municipal lawmakers should think carefully about spending taxpayers' money for what appear to be limited returns or utility. While the robots may serve a unique purpose in high-stakes public safety situations, like bomb scares and hostage situations, these events are extremely rare and do not warrant wide-scale procurement and deployment of expensive robots.

POLICY RECOMMENDATIONS

- Expand CCOPS legislation in state and local governments and municipalities to increase public oversight of surveillance.
- Pass federal legislation to regulate robot dog development and set guardrails for acceptable use cases.
- Ban the use of armed robot dogs.

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