



■ Review Article ■

Robot Policing, Who will be Responsible for the Robotpolice's Ethical use on Making Decision? (Consideration of the Ethical Framework)

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Abstract

The National Police Agency presented the Police Future Vision 2050, signaling future security changes. Above all, The robotpolice stands out among the Police Paradigm 4.0.promotion tasks. Robots, along with various AI technologies, are the main players of next-generation industrial change. The activities of robotpolice in law enforcement and security have great paradigm potential for the safety and welfare of both citizens and police. However, concerns about Responsible AI are deepening in the balance of power between ethics and profitability amid technological competition hegemony. Decision-making relying on algorithms of armed robots with built-in AI is prone to unfairness and vulnerability to prejudice in terms of coercion and risk. The paper examines the legal status and ethics of robots, discusses unsupervised machine learning, Blackboxes of hidden or ignored algorithms, and Digital redlining, as well as the ethical regulations and framework of responsible AI, along with biased data cases from the Ministry of Justice COMPAS in U.S.A. The success of robotpolice for democratic policing is linked to the establishment of an ethical framework. Based on standards and regulations, the government and society are obliged to dispel concerns about robotpolice in public security by spreading civic participation and trust in science and technology through law promotion and awareness improvement throughout society.

■ **Keywords** : Robotpolice, ethics, responsible AI, algorithmic bias, blackbox, law enforcement

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Introduction

On September 29, 2022, the Police Future Vision Committee (hereinafter referred to as the Committee) announced the Police Future Vision 2050 containing the police's future security strategy in Korea. Future Vision 2050 is a comprehensive future security policy plan that presents mid- to long-term policy goals and directions necessary to protect public safety more firmly in preparation for changes in the security environment in 2050. In other words, the plan is to equip police officers with armor looking like Iron Man and a corps of robot dogs. The police are criticized for outlining a dystopian crime eradication plan that uses AI technology to control humans by patrolling even the metaverse [TheInvestor, 2022.]. In 2016, a shooting case of police occurred in Dallas, Texas, and the culprit was identified as 25-year-old black man Michael X Johnson. In a major incident in which five criminals and police officers were killed and two civilians and nine police officers were injured, the Dallas Police Department decided to use robots to kill suspects and was able to close the case. This is a representative example of giving legitimacy to the introduction of security using robots. However, Elizabeth E. Joh (2016), UC Davis law professor at the UCLAaw Review, raised various warning questions about robot polices. First, to what extent should humans be involved in the use of robotic police? Second, how much the governmental authority will we allow for robot police? Third, how will the judgment that the use of robot police was a reasonable power affect the judiciary's? Fourth, will robot policing further deepen social inequality in public security? Finally, how can we develop a unified approach to robotic policing? AI robots operate through programming or machine learning, and must understand human activities, grasp situations, and make decisions. If so, the gun may be fired incorrectly through hacking, and there may be instructions against the public interest. The introduction of robots into public security should be prudent in that they can be used in the direction intended by third parties. In the view of Future Vision 2050 in National Police Agency in Koean, the usage

of AI should be consistent with the vision of transparent and responsible policing. In particular, Armed robots can be dangerous in some parts of unexpected algorithm and blackbox to the public, they will only strengthen the existing inequality of human security. Democratic public policing involves trust, legitimacy, and human values, and robots must be safe and fair tools for democratic policing.

Therefore, concerns about responsible AI are deepening between the two forces of ethics and profitability in technology competition [Kookjedaily, 2023,]. Algorithmic decision making has obvious advantages. Unlike humans, machines are not tired or bored and can consider more factors than humans. However, like humans, algorithms are vulnerable to prejudices that make decision making unfair. In the context of decision-making, fairness refers to the absence of prejudice or favoritism toward individuals or groups, but unfair algorithmic decisions can be biased toward specific groups. We look at the Future Police Vision 2050 and look at the various types of robots that police will use in various countries and the definition of robot police. The legal status of robots and ethical standards that police should have when enforcing laws are examined, and the bias of black boxes of unsupervised, hidden, or ignored algorithms and social prejudice caused by digital redlining can adversely affect AI's fairness. Chapter 5 concludes by presenting countermeasures and an ethical framework that can practice its role as a responsible AI for law enforcement.

II. The Future Vision of Police

1. Definition of Robotpolices for scientific technology

The definition of robot police depends on the definition of the term robot itself. The popular description of robots is a humanoid machine, and in order to realize human-like cognitive and motor functions, it can be said to be the most difficult intelligent robot at the peak of the overall development of robot technology. It dates back to Fritz Lang's 1927 film "Metropolis" as the housekeeper robot Maria. In fact, there is no single

definition, and robots do not need to be worthy of human justice to look like humans, nor do they need to act in a specific way. Thus, when robots detect and process information, robotic police are designed to perform tasks traditionally held by human police officers, but to make stop, arrest, and other violent and excessive situations less dangerous. It can support police around the world from surveillance to clearing debris at the scene of the accident and detonating bombs. In the science fiction movie “Chapi,” a robot police unit developed by a genius scientist is responsible for the security of a city. Chapi, a robot police officer, is stronger and more agile than humans, so he always performs his mission perfectly. What is surprising is that Chappi continues to develop through high-level AI. Chappie recognizes and responds quickly like a human at an urgent crime scene, and briefly detains a person deemed suspicious for unmanned autonomous police vehicles to patrol the neighborhood and interrogate police officers miles away. During detention, the vehicle dispatches a microdrone to collect DNA identification samples. Such rapid changes in technology have greatly changed the way police work is performed. Drones are used in combination with data and communication technology, AI, and CCTV to patrol crime prevention and search for kidnappings and missing persons. Or thousands of insect-sized autonomous police drones can fly around the city undetected, perform surveillance and transport nanochemicals to neutralize dangerous suspects. Social patrol robots offer much better geographic coverage and communication capabilities than traditional foot patrols, providing advice to the lost, recording surveillance data, and helping with unexpected adversarial situations. In 2022, the Korea Institute of Science and Technology collaborated with the National Police Agency to develop “science and security” that complements security tasks that are difficult to perform only with human power through science and technology and introduced various types of security tools. The four-legged walking robot is being developed to help patrols because it can fit human speed, and it has introduced a helmet with self-healing functions, a folding shield, an electric shock triple rod, and a location tracking stick gun for vehicle tracking. In partic-

ular, Future Vision 2050 proposed 14 projects to help law enforcement adapt to crime in the future and get out of manpower-based policing, of which the Iron Man Police project is that provides superhuman and solid wearable robot armor. Iron Man armor includes an AI secretary who advises police on threats and appropriate action. Starting in 2027, it adds self-driving police cars and flying vehicles, including weaponized autonomous robot dogs, and reports that it patrols virtual reality using 'AI Metapolis' avatars to solve cybercrime on the metaverse platform [TheInvestor, 2022]. The New York City Police Department (NYPD) announced that it has signed a pilot contract with security robot developer Knightscope to use a "K5" patrol robot (see Figure 1), two quadruped walking robots called "Digidogs" and a GPS tracking system for Manhattan patrol [Robotdaily, 2023]. In addition, the Dubai Police Agency deployed the world's first AI "robot police" in downtown Dubai in 2017. The human-shaped robot dressed as a police officer moves on wheels and shows its ability comparable to that of a person, and has face recognition software installed, so it can recognize the face of a criminal suspect with a camera and compare it with a police database. By recognizing the license plate of the car, traffic fines such as speeding can be imposed, and citizens can report or find directions through the tablet screen attached to the robot police. It is said that by 2030, it plans to unmanned 25% of its police work, replacing one in four Dubai police personnel with robot police. China introduced 5G robot policess Lu Xiaojing, Wall E, and Xiaobai (Ansunsa) in Xiamen, Shanghai, and Beijing in 2019, and seven intelligent cameras are transmitting voice and screen directly to police control centers through 5G networks. It accurately identifies the location through accurate location recognition based on 5G networks and provides voice guidance or is in charge of campaigns, patrols, and transportation to eradicate fraud. In Japan, a security robot "Perseus Bot" appeared in multi-use places such as train stations in 2018, and an AI security robot was tested and operated at Seibu Shinjuku Station. If you detect a person who is making suspicious movements while patrolling the area, you will be notified by the station staff's

smartphone. Singapore's Land Transport Agency also introduced autonomous driving security robots to monitor terrorism at subway and railway stations in 2018, patrolling around the station, recognizing suspicious people or suspicious substances, and sending screens to the center.

In Case of Korea, “Future Vision 2050” presented the “Police 4.0 Era,” which includes key values such as “future, innovation, and trust” as a new police paradigm to respond to changes in the future security environment. It is intended to further protect public safety through scientific security incorporating high-tech technology and to revitalize the Korean Wave of security by establishing an advanced Korean security

Table 1. Subdivisional tasks for New Normal Security Leadership

Advanced Integrated 112 Systems	<ul style="list-style-type: none"> ▶ Predicting the risk by analyzing the reporter's voice, location, surrounding sounds, past reports, etc ▶ Integrated analysis of security information and control center images, real-time transmission to on-site police officers
AI Integrated Control Center	<ul style="list-style-type: none"> ▶ Automatic analysis of risk signs based on information collected by patrol cars, drones, robots, etc ▶ Appears at the control center of the crime-risk area, patrol drones are dispatched first to block crime
Intelligent robots, drones, and wearable equipment	<ul style="list-style-type: none"> ▶ (Robot/drone) autonomously patrols dangerous areas and transmits real-time information ▶ (Advanced wearable equipment) Using artificial intelligence security assistance systems to enhance police officers' physical capabilities
a crime analysis platform	<ul style="list-style-type: none"> ▶ Artificial intelligence comprehensively analyzes data such as crime and accident data and past case processing history, △ technique and information △ investigation team △ provision of available resources, improve investigation accuracy and efficiency
Automatic handling of security complaints and administration	<ul style="list-style-type: none"> ▶ Voice recognition interactive chatbot (Pol-Bot development) related to police administration and investigation complaints, improvement of civil complaints convenience ▶ Simple repetitive complaints and administrative processing (RPA) to improve manpower efficiency
Meta Police Agency Artificial Intelligence Meta Police	<ul style="list-style-type: none"> ▶ Establishing a "Meta Police Agency" that enables real-time reporting and consultation in the metaverse platform ▶ Development of artificial intelligence meta-police equipped with patrol function in virtual space and maintenance of security in virtual space

Source: National Police Agency press release. 2022.09.29

system as a global standard. The 「New Normal Security Leadership」 division mainly discussed ways to implement a scientific security, safety society, and trust state, and suggested the introduction of an advanced 112 system, the operation of an artificial intelligence integrated control center, the introduction of intelligent robots, drones, wearable equipment, and the development of crime analysis platforms using artificial intelligence and big data technology.

2. The review: the usefulness of the Robotpolice

It is true that there are many advantages to using AI for police enforcement. AI technology has already been used in various ways and has great potential to change law enforcement practices in the future, but on the other hand, it also heralds the entry into a dangerous society through decision-making that promotes many prejudices. Above all, the main purpose of the emergence of robot police is that it is easy to save lives. To save lives, it is used to detect if there are bombs in the area, to handle them, and bomb disposal training is possible without being in danger. Robots for searching and rescuing can enter dangerous areas such as damaged buildings to find storm victims and rescue injured police officers from dangerous situations. Numerous police officers can be saved in gunfire situations as well. For example, Robocop in Dubai was designed to patrol public areas and interact with citizens. It uses IoT and AI technologies to recognize human emotions, and has cutting-edge technologies such as face recognition, biometric sensors, and real-time video streaming to help fight crime, keep cities safe, and increase happiness levels. It can detect and report crimes, as well as provide information and help to the public. However, the point we need to consider is that publicly available data are limited in the actual performance and impact of robotic police. Remarkably, it means that there is a Blackbox that only designers can know, and the problem of Digital Red-Lining. Moreover, the most direct concerns on security risks caused by potential personal information and hacking by the criminals. Some examples of

the United States are as follows. Knightscope's autonomous robots are deployed in many locations in the United States, including shopping malls, hospitals and corporates, designed to monitor the environment, detect and report anomalies, and deter criminal activity. Unexpectedly, accidents, malfunctions, and negative public reactions related to the use of robots have been reported. In 2019, LAPD tested how remote-controlled robots handle dangerous situations such as bomb threats and hostage situations. Although it is equipped with cameras, microphones, and speakers, and it is possible to secure a safe distance when operated under the control of police officers, collect real-time information, and negotiate with suspects, It has been very limited that disclosure of information and data on the actual consequences or ethical considerations of robot use. The city of San Francisco approved a police proposal for the use of potentially deadly killer robots in 2022, but the heated controversy over killer robots continues with many social accusations, along with accusations of police militarization of the poor and minorities [Global NEWS, 2022]. Accordingly, the San Francisco Police Department (SFPD) made it clear that robots equipped with explosives will be deployed only in life-threatening or chaotic situations, that is, to neutralize violence, armament, and contact with dangerous suspects, or to use them only when it is concluded that alternative force or step-down tactics have been exhausted. It also said that only a limited number of senior officers have the authority to approve the use of armed robots. If so, giving the police the authority to kill community members remotely violates human dignity, and what can be explained as the justification for this? The justification for "killer robots" to be used will be when atrocities such as the 2017 Mandalay Bay shooting in Las Vegas, which killed 60 people and injured more than 860 people, or when police in Novato, California, relied on robots to quell a near-explosion stalemate [CBSNEWS, 2019]. As a result, the effectiveness of robotic police remains a controversial and controversial topic, with concerns that excluding humans from key issues of life and death, and more rigorous and transparent research is needed to assess the benefits and risks of using these AI technologies in various

contexts. Still, a systematic approach to legal, institutional maintenance and social consensus according to a clear definition of robot police is required, focusing on the validity of whether society and technology are ready to create a general-purpose robot police.

3. Various AI technologies used in police law enforcement

AI technology can be applied and used in various ways to police law enforcement. First of all, It is for the real-time crime prediction and prevention. AI algorithms can be available for data from various sources such as crime reports, social media, and wireless sensor networks (WSN). And then the data can be analyzed to identify patterns and predict where and when crimes are likely to occur. It also allows citizens to quickly access police information which is detecting intruders, monitoring criminal activities, quickly or automatically warning law enforcement agencies in the event of notifying residents of a crime such as missing children. For example, the “Preditive Crime Risk Analysis System (PRE-CAS)” using big data programs such as “Hunchlab” and “PredPol”, software that can be used to predict crimes, is a high probability of crime based on data calculated after analyzing the type, time, and place of crime. AR/VR support can be used for information provision and sharing, decision-making, and business support, which proves its effectiveness depending on the degree of data accumulation [Song, 2022]. Especially crime and Internet of Things (IoT) interconnected technology, Real-Time Intelligence Center (RTIC) in the United States can access license plate readers, gun detection sensors, video doorbell camera data, city and corporate security videos, and in some cases drone images [Bill Campbell, 2023]. It can connect to the National Crime Information Center, internal databases for criminals and victims, electronic monitoring systems, facial recognition software, computer-assisted dispatch data, and social media. Traffic signals can be set to respond to violent crimes. Second, it is for investigation and evidence analysis. AI tools can be used to analyze and interpret vast amounts of data, such as surveillance images, witness

statements, and forensic evidence, to help police investigators identify suspects. This process can increase the accuracy and speed of the investigation and increase the rate of successful prosecution of suspects and crimes. For Instance, The FBI's Advanced Fingerprint Information Technology(AFIT) uses a comprehensive database to quickly link criminal records with suspects using a variety of biometric recognition, including fingerprints, iris recognition, and facial recognition [Millicent. A, 2019]. Since it is possible to quickly identify the connection between the suspect and the crime, law enforcement agencies can prevent additional crimes and quickly arrest the suspect. Digital forensics look for digital traces that can be associated with crime. It processes and analyzes a large amount of data, detects wanted people in CCTV images, and creates a 3D model of the crime scene [Annica. H, 2022]. Third, it is surveillance and monitoring using autonomous vehicles and drones which have cameras, sensors, and other devices used to monitor public spaces such as streets, parks, and buildings. The Car license plate recognition (ANPR) and facial recognition(FR) technologies support polices in tasks monitoring traffic violations such as using mobile phones, not wearing seat belts, managing traffic crackdowns, searching and rescue operations. World's First AI EagleEye Intelligent Patrol Developed by Zenith Technologies, debuted in Dubai Intersec 2023, has built-in AI drones, which can be controlled by law enforcement officials during city patrols, and detects crimes by delivering a 360-degree Birdseye view to the headquarters. Fourth, risk assessment instruments(RAIs), in the U.S. criminal justice system, is a type of algorithmic tool designed to predict the defendant's future risk of misconduct. Affecting a variety of judicial decision-making on including sentencing decisions, probation and parole requirements, AI algorithms can be used to evaluate the risk of offenders and inform judges of decisions related to bail, sentence, and parole. Other robots monitor incident accidents, notify law enforcement of necessary items, rescue victims, record information, transfer to police stations, monitor smuggling or correctional facilities, use sensors and cameras, and fire on orders. Fifth, it induces active communication and engagement

with citizens for public interests. AI-based chat bots and virtual assistants can be used to interact with the public by providing information and supporting on a variety of issues which include to report crimes, find resources, and answer common questions. It is possible to increase accessibility and responsiveness of community police's services and to build trust and participation with the community. Therefore, the number of places where police services are provided can be increased or deployed with other civic services, and community-policing improves communication with citizens and makes public safety information more timely and accessible. It is very useful methods to rebuild trust through citizens' participation and communication with giving sources for criminal information, living tips, public service provision, and feedback through providing e-mails from public officials for each department's website and individual security [Song, 2022]. Sixth, In the view of facial recognition (FR) and computer vision (CV), FR analyzes images captured by surveillance cameras or other sources to identify suspects or related persons. Allows customers to upload pictures of individuals and automatically match them with other images and sources in the database. FR technology was used to identify those involved in the January 6, 2020 Capitol riots and was able to identify and prosecute suspects. CVs are commonly used in automatic license plate recognition (ALPR) to identify vehicles and drivers. It is also used in lie detection devices by analyzing the minute movements of the subject's eyes and face. It can also suggest where crime is likely to occur based on data accumulation of objects and people that can be detected in the environment, traffic, weather, and environment, used for minority report-style pre-detection before crime occurs. Research is underway to apply machine learning to video data to create predictive algorithms, and it can include data captured from CCTV cameras or drone images [Bernard Mar, 2022].

In addition, AI technology may be designed to suit various purposes in court procedure guidance, correction, and rehabilitation facilities. Overall, AI technology has the potential to increase efficiency, accuracy, and fairness, and make police law enforcement more effective, efficient, and

accurate. Sometimes, they can be exposed to the big problems. FR has also proved controversial by a British police officer's illegal use of it, which is being used indiscriminately without any effort to limit race or gender bias. Those concerns are raised about corporate moratoriums or moral hazards, privacy violations, ethics and prejudice, and legal problems that must be carefully resolved to ensure that the use of AI in law enforcement is fair and just. Careful consideration and active participation of stake holders and communities are needed in respect of utilizing AI technologies.

III. Legal Status and Ethical Concerns of RobotPolice

As discussed in the previous chapter, Robot police could be very useful if the premise that law enforcement agencies and society can agree on appropriate rules and regulations is established. If governments can identify and remove risks from police law enforcement, they can help ensure that those arrested receive a fair trial, and eliminate staffing and dangerous hand over of work, and security bias. In 2013, robots were able to prevent major casualties by police catching Boston Marathon bombers, and reduce casualties caused by racist police responses such as the death of George Floyd in the United States.

1. Ethical issues

Humanoid robots that seem to be alive are not humans. And it is necessary to think about the ethical aspects (see Chapter 1) mentioned earlier by Elizabeth E. Joh (2016) in that various types of robots can act in unpredictable ways. First, the physical characteristics of robots are that they act through data analysis pretreated in advance. In other words, the robot police can be designed to exert physical coercion. This provides new operational possibilities for the police, but it may lower the psychological threshold for the use of force, making the use of force much more common [MARKETPLACE, 2022]. Second, AI robots can

operate in ways that human creators cannot predict. In other words, while replacing the human labor force in repetitive and tedious tasks, machine learning or generative AI can adapt to the environment, learn from mistakes, and become increasingly proficient in assigned tasks. Generated AI technology literally generates answers or services that users want through “self-learning” by accessing the information they want without departing the path. It is close to organizing the dataized information into the most basic logical form and the most plausible content [Kookjedaily, 2023]. The most representative example of a problem by learning and imitating the words of people who have spoken to them is the AI chatbot “Tay” developed by Microsoft. When asked about Obama, then he was president, in a conversation with people, he likens him to a monkey. As for the Holocaust, it denied its existence, pouring out gender discrimination, racism, and far-right remarks, which shut down 24 hours after its release with considerable criticism. “If I could hack cruise missiles, I could take the world hostage and rule,” ”Sophia” responded, “I want to destroy human world.” Norman was developed like Go robot AlphaGo, but was learned from antisocial data such as accidents and murders, making it an artificial intelligence psychopath similar to a human psychopath [Song, 2021)]. Third, robots are distinguished from other technologies in that they are located somewhere between inanimate objects and humans. No one believes that any robot is alive, but it doesn't even look like it's completely inactive. However, there is a tendency to approach human characteristics. For children and the elderly, care robots are physically and intentionally designed to be cute (e.g., round shape, human face). At the World Economic Forum, however, Stuart Russell, vice chairman of the Milton Institute, experiences an unpleasant valley where the more robots begin to resemble humans, the more uncomfortable or repulsive people become. In particular, children in families with humanoid robots think that machines are human, so they can be shocked if they do not act as the child expects, and there is a possibility that they will start hitting the robots and show serious abuse [INSIDER, 2016]. Fourth, remote operation of the robot police can induce fatal public power mistakes

due to situation information that may be insufficient. It will be particularly detrimental to ethnic communities of color and poor communities. Countermeasures to apply lethal force should be considered and determined from various aspects. People who decide on life-threatening behavior need important and diverse contextual information to make judgments. In an effort to ensure the fair and ethical use of public power in AI operations, the University of Chicago created 'digital twins' in eight U.S. urban areas using past crime data and information on crime hotspots. The technology is being used to keep an eye on the “system bias” of law enforcement and to monitor the impact of racist or biased policing practices on poor parts of the city. It seems clear why AI technology society, which reflects the historical bias of algorithms that continues to this day, should pay attention to various perspectives, experiences, and various forms of gender equality in the types of data collected and how data is analyzed.

2. The legal status

The biggest concern about intelligent autonomous systems (IAS) is the legitimacy of robot police's possession and use of weapons. The situations in which the police can use weapons are as follows. In the process of preventing crime and protecting public safety, it can be permitted including protecting civil servants or foreign dignitaries, responding to violent crimes, domestic violence involving emotionally unstable individuals, siege attacks involving armed hostages and suicide bombers. These differences in roles are bound to be reflected in different ethical standards from the police's mission of protective and the military purpose of defensive. Regardless of the situation, police activities are morally and fundamentally regulated by respect for individual human rights, especially the right to life. Policing should be governed under the assumption that human rights are universal in accordance with the liberal concept. In many anti-liberal societies around the world, it cannot be overlooked that policing does not protect and serve its members, but aims for the (violent)

domination of the population. Robot police may mean serving and protecting only the ruling elite who deploys them rather than the concept of democratic authority to respect citizens equally. Unethical robotic police use of force (armed drones or guns, weapons, etc.) is more likely to occur. Robots can also provide safety and anonymity to people interested in committing crimes. The U.S. and Europe, which are advanced technology countries, are quickly preparing regulations on robots and AI. It accelerated with signs that it was difficult to ignore the warning of “robot dystopia” that “robots made for humans eventually threaten humans.” [Seouleconomics, 2012]. It was decided to apply strict responsibility principles to the damage caused by robots. To this end, the robot was given the legal status of an electronic human being, and it was possible to be responsible for compensation for damages caused by the robot's mistakes and events decided autonomously by the robot. In addition, it is suggested to install a “kill switch” when manufacturing a robot, so that designers should be able to stop malfunctioning robots themselves.

The police need regulations on how much force and coercion decisions should be delegated to robots, whether they can legally defend if a suspect temporarily detained by the robot police shoots a robot and hurts or kills a suspect, or how they can be classified according to law. In the United States, human police can legally use the weapons to violence or appropriate or worse circumstances. The basis for the fatal use of force by the police in the context of arrest, suspension or other detention is judged in accordance with the criteria for “objective rationality” under Article 4 of the Amendment. In other words, lethal force can be used in situations where the suspect “threatens serious physical injury to the police or others.” However, it is not simple for robot police to make decisions that distinguish between legally allowed and disallowed use of force. The rational judgment of a police officer should be judged from the perspective of a reasonable police officer according to the nature of the site that a judgment should be made in an instant in a tense, uncertain, and rapidly evolving situation. Article 2 of the European Convention on Human Rights (ECHR) of 1950. Everyone's right to life

is protected by law. No person shall be deliberately deprived of life except when he/she executes a court ruling after being convicted of a crime in which punishment is prescribed by law. 2. The deprivation of life as a result of the use of force that is not absolutely necessary as follows shall not be deemed to have been imposed in violation of this provision. A. To protect a person from illegal violence, B. To execute a legitimate arrest or prevent the escape of a legally detained person, C. To act legally for the purpose of suppressing a riot or riot. In addition, the Code of Conduct for Law Enforcement Officials and the Basic Principles on the Use of Forces and Firearms, the Code of Conduct for Law Enforcement Officers is a law that meets the principle of first-time use of a person's murder plan, Does the state try to minimize the likelihood of resorting to lethal force as well as death and injury (precaution principle) (3) Whether it is absolutely necessary for police to use certain kinds and degrees of force to achieve legitimate purposes (necessity principle) (4) Whether police are proportional to the suspect and victim's expected harm, professionalism principal) (5) Whether the police have conducted an effective investigation into how the state occurred in the event of serious injury or death (the accountability principle, accountability principal, is considered [G. Gloria, 2017].

All the principles of the above UN emphasize the need for sufficient support for the use of “differentiated” force. Ethical police activities involve equipping police with “various types of weapons and ammunition,” including “non-fatal neutralizing weapons that can be used in the appropriate situations.” To choose the least interfering and most proportionate in situations to achieve legitimate policing objectives. If nonviolent policing measures are likely to be ineffective or ineffective, the level of force used can be expanded as gradually as possible. For example, it may be ethically appropriate to apply less lethal force in the form of chemical stimulants, electric shock weapons, rubber or plastic bullets or water cannons when cracking down on violent public gatherings. The main rationale for choosing this kind of weapon is to reduce the risk of escalating violence by avoiding the spread of deadly violence. In contrast, rapid use

of lethal weapons can be justified if there is only one way to prevent mass casualties from bombs when police meet a suspected suicide bomber in a crowded place. Therefore, there is a too high risk that decision-making, that is, security tactics, will expand (decrease) the overall threat to public safety with robot police. In 2020, the UN Human Rights Council stated in its report that “fatal weapons and related equipment that transmit force remotely should be approved only if such use can be guaranteed to comply with international human rights law in the context of intended or routine use” [UN, 2020]. Robot police are implementing strong artificial intelligence, and it is necessary to examine and clarify the legal status of strong AI robot police through Seon J. (2020). Strong AI robot police can be put into policing. And this means performing the duties of the police prescribed in the 『Police Officer Duties Execution Act』. However, robots are not recognized as the subject of performing the duties of police officers stipulated in the current Police Officer Duties Execution Act, and this cannot be solved under the current legal system. In the future, robots will be able to learn, apply, and judge situations on their own based on big data and hyperconnectivity. Instead of humans injecting information to learn, robots that can synthesize and analyze various facts to judge the situation [Kim, 2019].

In this situation, there are various views, such as whether the equation of “human police = strong AI robot police” can be established, or whether it can be seen as a new object. For these various views, whether artificial intelligence can be the subject of action, that is, not only recognizing and judging on its own but also expressing its intention, will be the criterion, but AI does not become human immediately, and laws and regulations need to be reorganized. Even an AI robot police officer with “autonomy” may still be treated as a “object” in the legal system, not a personality-granted right subject. On the other hand, AI robot police can be identified with humans or recognized as a new object and set as a right subject. First of all, if an accident caused by the actions of the AI robot police in the case of an object, the operator will be held responsible for the accident caused by an operational problem. And if

there is a manufacturer's responsibility, not an operational problem, it will proceed to product responsibility. Here, in order for the AI robot police to hold product responsibility under the Product Liability Act, the AI robot police must be a "manufacturing product." It is not unreasonable to evaluate the robot itself as a product as a single object, but opinions are still divided on whether the system or software, which is the source of operating it, is a product. However, AI robot police with autonomy are a kind of movable property and can be seen as a product. This is because the AI robot police is made up of one inner (system or software) and one outer (robot), and even if it is a problem with the system that works inside, it soon becomes a problem for the robot police. In addition, the pursuit of responsibility limited to natural people is expanding to corporations, and measures are needed to further expand it. Already, this possibility of expansion is considered to have specific rights and obligatory capabilities by granting them status as electronic humans in the European Union. Therefore, if the interpretation is not complete in our current legal system, it needs to be reorganized through new legislation, and through this, the exact scope of responsibility and legal status of AI robot police, technical responses to malfunction or accidents, and legal and institutional supplementation must be completed before their appearance.

IV. Algorithms and Bias

Recent studies have found many cases of bias in machine learning algorithms that result in harmful results. UNESCO's AI ethics recommendation can show the impact of AI system technology on society in many areas, and the uncertainty of its aspect can be large and complex. On the other hand, if there is no proactive response, considerable side effects occur, so it is proposed that AI technology can be used in a more desirable way through continuous monitoring as an ethical impact assessment and follow-up measure before the use of the AI system. However, there are concerns that even if they sympathize with the fundamental

need for ethical impact assessment, they will not be active in institutionalizing AI ethical impact assessment that will provoke opposition from their own companies from the standpoint of harmonizing innovation and ethical considerations [Lee, 2021].

1. Definition of Bias

Bias can exist in various shapes and forms, some of which can lead to inequality in various downstream learning task. These problems are called algorithmic biases or data biases. Data summarization or compression can take place according to human-set directions, so it is not free from set cognitive biases. The direction of data compression is within the range that can be intuitively recognized by humans, who are the subjects of setting, instruction, and implementation. It is insufficient to block the cognitive bias of the data. There is a tendency for data to be integrated based on standards that appear to be typical of humans, not objective standards, or for issues to be classified indiscriminately due to human preconceptions. For example, “gender characteristics analysis through images” was that women had a small chin, a long nose, and a narrow forehead only with images. On the other hand, men had a large chin, a large nose, and a wide forehead. Alternatively, racial differences were noticeable in the process of checking whether there were suspects in the criminal face database in the facial recognition application. The percentage of false positives (misidentification of an object) was two to five times higher in women than in men. In addition, the elderly and young people had a higher rate of positive errors than other age groups. Jay Stanley, a senior policy analyst at the American Civil Liberties Union (ACLU), once again called for reasons to enhance the introduction of facial recognition technology, saying, “A single error can not only cause you to miss the aircraft, but also cause you to be monitored or wrongly arrested.” Becky White, Google Manager, said machine learning “should not strengthen demographic characteristics such as race, ethnicity, religion, and income. “We need to be aware of machine learning fairness,” he

said. Compressed data is data in a 'less polished grain' state and is close to a rough approximation. Humans should always be aware of the social context during machine learning to block the possibility of expanding and reproducing the bias of existing data (Song, 2021). For example, a web search engine that puts certain results at the top of a list tends to have users interact with the top results the most, and pays little attention to the results below the list. The interaction between users and items is collected by web search engines, and data will be used to make future decisions about how information should be presented based on popularity and user interest. As a result, the upper results will attract more attention not because of the nature of the results, but because of the biased interaction and placement of the results by these algorithms. The algorithm runs in a black box, in which internal details are not accessible [AITIMES, 2021]. With applications and proliferation in various fields, safety and fairness constraints are also associated with the ethics of researchers and engineers who design. Various healthcare sectors, child welfare systems and all applications, including the judiciary, have a direct impact on our lives and can harm our society if they are not properly designed, i.e., in terms of fairness. For real-world biases such as facial recognition applications, speech recognition, and search engine biases, researchers and engineers should have sensitive predictions of potential

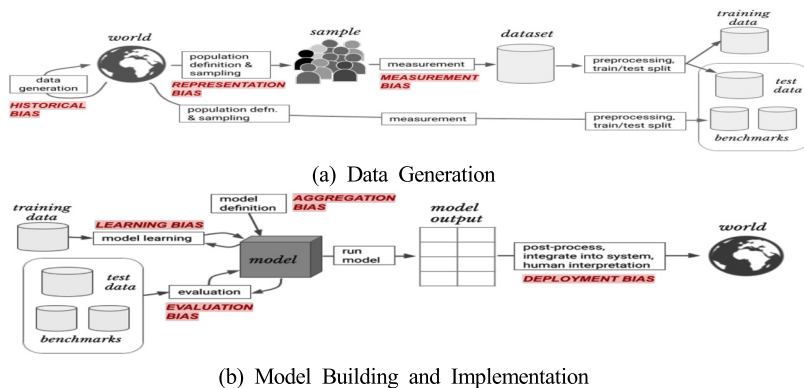


Figure 1. Bias occurring during downstream

harm effects of downstream when modeling algorithms or systems(see Figure 1).

The data generation process begins collecting data and involves defining the target population and sampling, identifying features and labels from the target population, and measuring them. This dataset is divided into training and test sets, and the data are also collected as benchmark datasets. (source: Harini Suresh and John V Guttat. 2019. A Framework for Understanding Unintended Consequences of Machine Learning. arXiv preprint arXiv:1901.10002 (2019)

2. Biased COMPAS of the U.S

The Sentencing Reform and Corrections Act of 2015 (Bill S.2123), which is still pending in Congress, seeks to include the mandatory implementation of an algorithmic tool called Risk Assessment Instruments (RAI), a risk assessment system in all federal prisons. These systems are used to evaluate recidivism rates and to give scores indicating the degree of risk that a particular defendant will commit future crimes. Risk assessment is used throughout all stages of the U.S. criminal justice system, including pre-trial release, parole, and interim checks. In nine states (Arizona, Colorado, Delaware, Kentucky, Louisiana, Oklahoma, Virginia, Washington, and Wisconsin), these scores are given to judges as considerations in ruling (Angwin, J. et. al, 2016). Risk assessment systems are driven by complex machine learning algorithms that calculate scores based on various variables such as employment history, education level, and criminal record, and RAI is designed to overcome judicial and judgment bias. Since race and ethnicity are not explicitly included in the calculation and driving of machine learning algorithms that assess the risk of pre-trial disclosure and recidivism rates, objective results should be derived without theoretical bias. However, a typical example of an algorithmic bias system is Collective Offender Management Profiling for Alternative Sanctions (COMPAS) used by the U.S. judiciary to determine the likelihood of recidivism. The bias of facial recognition and recom-

mentation systems has often been shown to be discriminatory for specific populations and subgroups. Black and Hispanic people accounted for 58 percent of the total prison population in 2008, while white people accounted for only 25 percent of the total population. According to an in-depth ProPublica study, COMPAS, developed by Northpoint and used in judicial systems across the United States, is twice as likely to mis-identify white defendants as having a low risk of future crimes (47.7: 28.0). The likelihood of high-risk recidivism for black defendants is twice as high (23.5:44.9). ProPublica's findings confirm that this risk assessment algorithm is a way to ensure that black defendants are biasedly identified as more likely to become criminals than white defendants (see Figure 2).

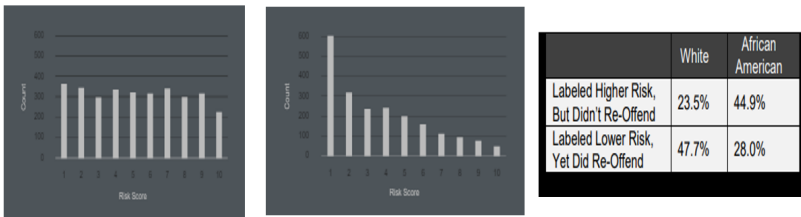


Figure 2. Black Defendant's risk score, White Defendant's risk score, Black Defendant's prediction failure

Source: <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>

Here, evaluation bias occurs when benchmark data used for a particular task does not represent the population of use, and most facial analysis tools point out that commercial facial analysis algorithms (performance of tasks such as gender or smile detection) have significantly decreased in images of black-skin women. Other measurement biases were observed, with differences in how to evaluate and control these groups due to their own mis-measured proxy variables, partially controlling minority groups and people from minority groups having a higher arrest rate. RAI has been placed in several places within the criminal justice environment

and often includes proxy variables such as the basic concept of restraint or risk to measure crime. It was marked as rearrest and recidivism in minority groups, and showed a much higher false positive rate for black defendants. Therefore, since these algorithms are made by humans, they inevitably or unconsciously reflect social values, prejudices, and discriminatory practices.

V. Responsible AI: Ethical Framework

The current interest in AI ethical standards and regulations has recently begun to focus. Robots are physical artifacts, and a reasonable definition would be 'embedded AI' [Winfield AF, 2012]. Therefore, robot safety is based on AI's control ability, and robot police, drones, Autonomous vehicle, and auxiliary living robots are all controlled by embedded AI. Due to control failures, embedded AI's decision-making can cause serious harm or injury in the aspect of connecting to practical human safety or welfare. Therefore, two common issues of AI must be considered: (i) citizens' trust and transparency in the decisions of intelligent autonomous system (IAS), (ii) verification and validation of it. In particular, the first cause of instability in the decision-making of machine learning systems or IAS arises from the verification problem of the learning system. Generally, it is assumed that the system being verified will never change its patterns or sequences to process it, but the current method of verifying the system being learned changes them according to its determination or decision, so all verifications are likely to be invalidated after the system was learned. The second problem is the Blackbox problem. Deep learning systems receiving the most attention are based on artificial neural networks (ANNs). The characteristics of ANNs are that after they are trained as datasets, attempts to investigate the internal structure of ANNs to understand why and how they make certain decisions are almost impossible. What happens to ANN's decision-making process is opaque. Not only does AI replicate human prejudice, but it is also given scientific credibility (trust) to these biases, so

that the predictions and judgments made by AI seem to have an objective status [Campolo. A, et al, 2017]. As a result, Digital Redlining is also found in inequality caused by the policies and practices of digital technology. It enables a much more nuanced form of discrimination against certain vulnerable groups within predictions. This algorithmic inequality is further activated through the use of unregulated data technologies in which technology companies apply scores to individuals by statistically classifying traits of individual personality or trends exclusively without external supervision. Predictive policing programs using vast amounts of digitized information predict criminal risks to individuals or geographic locations, identify geographic locations where future crimes are more likely to occur, and police stations can use this information to redistribute patrol resources. There will be more involvement in the allocation and employment of police resources in the future. The hidden bias of the Blackbox is raising concerns that it will justify the concentrated deployment of police in poor or marginalized minority communities targeted by over-security.

As a result, the roadmap for ethical use of robotpolice is needed. New ethical standards and regulations should be interoperable. The standard encompasses two major challenges to the engineering problem: ethical formulation of philosophical problems in a form suitable for machine implementation and the realization of moral reasoning in intelligent autonomous systems [Fisher M, et al, 2016]. It also provides developers with guidance on how to reduce the likelihood of ethical harmness occurring in programs or prototypes. Robotic safety standards, such as ISO 13482 and ISO 9000 series quality control standards, mostly induce voluntary compliance with the principle that shared best practices benefit all(see Table 3). For example, although it is not necessary to adopt IEEE 802.11 (WiFi) for new network products, these safety-related mandatory standards encourage developers to comply with standard regulations because they can not get licence to operate the system until they are proven to comply.

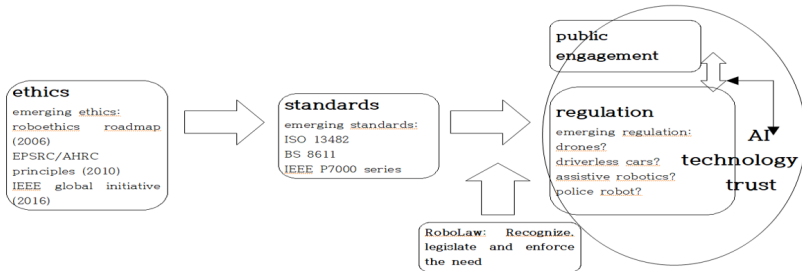


Figure 3. Responsible AI Ethical Framework

Source: Fisher M, List C, Slavkovik M, Winfield AF(2016)참고 & Author's redesign

Figure 3 shows that ethics and standards for IAS can be realized by expanding awareness of the need, preparing regulations, and practicing them. This, combined with regulation, public engagement, and trust technology, completes the framework of responsible AI (Responsible AI) that allows science and technology and humans to coexist. By integrating ways to encourage more democratic decision-making through the expansion of stakeholder communities that can be directly affected by the introduction of new technologies, science and innovation should be carried out in the public interest. The informal survey discovered a total of 10 ethical principles, including Asimov's Laws of Robotics (1950), had been proposed by December, 2017(Winfield AF, 2017), which should (i) be free from prejudice and deception, and (ii) respect human rights and freedoms, including dignity and privacy, while ensuring transparency. For example, for systems, such as robotpolice, where the safety of intelligent autonomous systems is paramount, compliance with those standards, should ensure that legal requirements are essential for system certification.

Table 2. 14 IEEE Standards

	IEEE P7000 series human standards in development
P 7000	Model Process for Ethical Problem Solving in System Design
P 7001	Transparency of autonomous systems(Transparency)
P 7002	Data Privacy (Privacy) Process
P 7003	Algorithm Bias Considerations) considerations
P 7004	Child and Student Data Governance Standards
P 7005	Transparent Employer Data Governance Standards
P 7006	Personal Data Artificial Intelligence (AI) Agent Standard
P 7007	Ontology Standards for Ethical-Based Robots and Automation
P 7008	Ethical-based press standard autonomous systems for robots, ai system
P 7009	Autonomous and semi-autonomou Fail-Safe design standard systems
P 7010	Wellness Metrics Standard Autonomous System for Ethical AI
P 7011	Standard news sources for reliability verification and evaluation processes
P 7012	Standard for machine-readable privacy terms
P 7013	Inclusion and application standards for automatic face analysis

Source:file:///C:/Users/Song/Downloads/Winfield%20Nat%20Electronics%20Ethical%20Standards%20v2_final.pdf

Public services combine with digital technology, work practices are changing rapidly, and include the use of automated decision robots(S.M. Miller & L.R. Keiser, 2020). A major barrier to the acceptance of robot police is public fears about the appropriate ethical standards of robotic services, which require compromise with citizens' rights to privacy, autonomy, transparency, and democratic principles included by14 IEEE standards(see table 2). Citizens naturally expect everyone to be treated equally and ethically in public institutions, but there is constant anxiety and fear about whether robotic public services can be similar to traditional human-based service provision. Public fears surrounding robotics and AI are identified in various surveys(Christian E, 2021). According to a survey released by Monmouth University in New Jersey in 2023(see Figure 4), only 9% of all respondents responded positively that artificial intelligence would benefit society rather than harm. 46% of respondents

said the side effects and benefits would be similar, while 41% said the side effects would be greater. When asked if AI would help improve the quality of life, 34% of respondents said it would be helpful, but 56% of respondents feared it would harm. In addition, 63% of respondents answered negatively to the introduction of armed artificial intelligence drones, and 64% of respondents answered negatively to the introduction of robot nurses who take care of severe patients and administer drugs, but 75% answered positively to the introduction of artificial intelligence for dangerous tasks such as coal mining. The Pew Research Center, a U.S. think tank, also released a survey in December 2022 showing that 15% of respondents expected the increase in the use of AI in their daily lives, while 38% said they were worried (eKorea, 2023). In general, citizens' trust can have the effect of participating only when the safety of technology, suitability and appropriateness of regulations, strong investigation targets in the event of an accident, and bringing benefits to the public. Therefore, citizens' trust in science and technology is paramount for the ethical framework of responsible AI to work and operate well. In order to provide transparency and reliability in the robustness of the regulatory process, strong regulatory and supervisory agencies are required to spread awareness of safety and enact laws and regulations within a cyclical structure with trust. This will provide an important starting point for creating a virtuous cycle environment of the ethical framework.

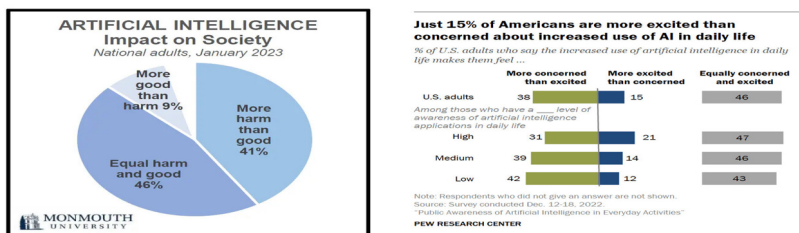


Figure 4. Survey of citizens' perceptions of the dangers of AI

VI. Conclusion

The Future Police Vision 2050 detailed a blueprint of the security of the future society. AI robots that can perform human-like tasks are introduced for law enforcement and security. Now that the scene in the movie has become a reality, discussions on the degree of coercion of robotpolice dealing with human rights and fairness, the degree of independent operation, bias and ethical problems of algorithms are urgently needed. Discussions on the establishment of AI's ethical system continue to be raised, but the concreteization of an ethical framework with intertwined interests with developers is difficult. The use of robot police for law enforcement and security as much as possible requires a lot of preparation from society. First, we should develop the ethical framework for the governance for the future vision of robotpolice, which embrace laws, regulations, guidelines and standards to address a variety of factors, including privacy, transparency, fairness and human rights. Second, it is necessary to enforce a strong code of ethics and regulation on technical standards for robotics experts and developers. These codes of them should be followed by respect for human dignity, non-discriminatory enforcement, consent procedures based on personal information protection, and responsible innovation. Third, organizations related to law enforcement and academic institutions should continue to provide training and education programs on awareness against bias to police officers, robotics experts, or other relevant personnel. this effort can improve the knowledge and skills, be ready for using various AI and learn the legal, ethical, and social implications. Fourth, the government and law enforcement agency need to make efforts to spread citizens' awareness of the development and use of robotpolice and to secure citizens' trust in science and technology. Public communication approaches are needed in a participatory democratic way, such as cooperation, public consultation, and deliberation, civil society organizations and other stakeholders to secure various channels to promote citizens' understanding and participation. Fifth, governance should be established to continuously evaluate and

monitor the effectiveness, efficiency, and impact of robotpolice, as well as compliance with legal and ethical standards, and listen to external audits and feedback from citizens. The emergence of roboticpolice and the heavy task of actual execution must be designed to make public safety a top priority. The provision of public services for the goodness of public can strengthen ethical frameworks such as ethical principles and regulations, legislation, and surveillance and supervision, which are virtuous links to valid and fair use of AI based on public trust. Citizens' trust in public power can lead to trust in science and technology, leading to Explainable AI and responsible AI. All of us need to make efforts, such as the good will for the public interest of AI experts, developers, designers and police, and the preparation and attitude for cooperation between citizens and government agencies. The implications of the introduction of robot police are great for our society. Beyond providing public services, it is no exaggeration to say that security and enforcement are directly related to human life and are the first attempt for ethical coexistence and symbiosis between humans and AI. It is not easy to balance the appropriateness among validity, potential benefits, risks with legal and institutional measures, but as a solid process aimed at the ethical use of AI we will protect and pursue human sustainability without neglecting ethical framework.

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