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38 NORTH

38 NORTH SPECIAL REPORT

Digital Surveillance in North Korea

Moving Toward a Panopticon State

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April 2024

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Contents

Executive Summary 7
Key Findings 9
Methodology 11
Chapter 1: Setting the Scene 12
The Surveillance and Control Landscape in North Korea 12
Chapter 2: Biometric Technology Research in North Korea 15
Fingerprint Recognition 16
Voice and Speech Recognition 18
Palm Recognition 20
Facial Recognition 22
Chapter 3: State Collection of Biometric Data 24
Identification Cards 25
Chapter 4: The Proliferation of Surveillance Cameras 27
The China Connection 29
Use of Surveillance Cameras in Schools 31
Surveillance Cameras in Workplaces 34
Other Uses of Surveillance Cameras 38
Chapter 5: Road Traffic Surveillance 41
Chapter 6: The Border Surveillance Network 48
Chapter 7: Facial Recognition for Security and Identification 51
Facial Recognition at Sunan Airport 57
Amnokgang Technology Development Company 58
Chapter 8: Tracking Citizens via Electronic Payments 59
North Korea's Electronic Payment Systems 60
Chapter 9: Surveillance on Telecommunications Networks 64
Mobile Networks 64
Wi-Fi 65
Internet 66
Streaming Services 66
Chapter 10: Factors Holding Back Greater Deployment of Digital Surveillance 70
Chapter 11: Citizens' Limited Awareness About the Realities of Digital Surveillance 71
Misinformation Regarding Digital Surveillance 71
Thirst for Knowledge and Know-how 72
Helping the North Korean People 72
Acknowledgments 73
Appendix: Major Development Organizations 74

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Executive Summary

Digital technology is progressively entering into different facets of life in the Democratic People's Republic of Korea (DPRK or North Korea) and reshaping the landscape of its society, especially in Pyongyang. Smartphones can now facilitate electronic payments; set-top boxes offer additional TV and streaming options; cameras keep watch on traffic in major cities; and electronic cards provide access to transportation.

However, this digital transformation comes at a price: as these technologies continue to roll out, the digital footprint for North Korean citizens becomes larger, and the North Korean state's ability to gain a deeper insight into people's lives grows.

North Koreans are already among the most tightly controlled and surveilled people in the world. The state makes numerous demands on their work and free time, limits their ability to move freely within their own country, dictates the media they can consume and restricts their freedom of speech. Citizens are constantly at risk of random or targeted inspections that can involve a complete search of their home or their person.

Much of the country's existing surveillance network relies on a massive network of human intelligence gathering. From state security agency officials and police all the way down to the workplace administrators and the *inminban* (인민반) leaders who keep watch on their neighborhoods, some estimates say as many as 1 in 20 North Koreans is part of the existing surveillance system.

The network is large and complex and has served the leadership and Korean Workers' Party (KWP) for years, keeping citizens under control to the extent that any challenge to authority is almost unheard of.

However, the state is not all-seeing yet. Small spaces exist that allow North Koreans to engage in illicit business activities, consume foreign media and privately criticize the government. The state's inability to support its citizens means that if caught, people can often offer bribes to escape serious punishment.

The continued adoption of digital technology threatens to erase many of these spaces. A combination of the heavy state control exerted by North Korea and pervasive digital surveillance, such as that carried out in China, could extinguish all but the tiniest freedoms for the North Korean people.

According to our research, North Korea is building surveillance capabilities that reach across various facets of public and private life. While the state may not yet have the capacity to fully utilize all the data it can collect, it is moving towards even greater surveillance of its citizens, enhanced by digital technology.

The move is underpinned by several decades of research into biometric technology. As we outline in the report, facial recognition is in active use in the country, and the state is building a biometric database of citizens that includes photographs and fingerprints.

Facial recognition has the potential to track people wherever they go, and digitization of fingerprints will make the use of fake identification cards difficult or impossible. New video surveillance networks along the country's northern border could make smuggling difficult, and a road surveillance network is spreading from Pyongyang to other cities.

The wider use of surveillance is not just trained on citizens, but also on the security services themselves—an apparent attempt to make the acceptance of bribes more difficult.

The danger these new technologies pose to the populous is exaggerated in North Korea because, in the absence of a watchdog media, many of its citizens lack a complete understanding of their digital footprint and the ways it could be used against them.

In this report, we look at the North Korean state's steps further into the digital world and how this is being or might be used for surveillance purposes.

To do this, we examined technology currently in use in North Korea, looked at research on surveillance technologies being undertaken at universities and state organizations, and reviewed domestic and international media coverage of technology. We also conducted interviews with 40 North Korean escapees to get a sense of surveillance when they lived in the country and surveyed 100 current North Korean residents to find out the latest situation and understand their views on digital surveillance.

In our research for this report, we did not spend a lot of time detailing digital surveillance on smartphones, as the area was comprehensively covered in our previous Project Reveal report.

Key Findings

Work on digital surveillance technologies has been ongoing for years

Research and development of biometric technology have been going on for decades in North Korea. Some of the earliest work in the late 1990s was around fingerprint recognition, but this has progressed to more advanced technology, such as facial and license plate recognition. The work has led to domestically developed software and hardware products that utilize biometric data to verify identity and track people and vehicles in public spaces.

The state is collecting the data required for a national biometric database

The latest version of North Korea's national identification (ID) card comes in a smartcard format, and renewal requires citizens to provide fingerprints, have their photo taken, and, according to one report, take a blood test. As a result, almost every North Korean citizen surveyed reported that the state has taken their fingerprint data. How the biometric data is stored and accessed is unclear, but the ID card procedure means the state possesses the data to build a biometric database of all citizens.

The use of surveillance cameras is proliferating, especially in schools and workplaces

In surveying North Korean state media coverage, cameras appear in most school classrooms in major cities. The cameras can be monitored by the head teacher, who can pan and zoom to focus on an individual student or teacher. Our interviews with escapees and current residents uncovered widespread use of cameras in some workplaces and government buildings, and state media has reported on facial recognition in use at the country's international airport.

A road traffic surveillance network is expanding

Traffic cameras began appearing at intersections in Pyongyang around 2016, and since then, the network has expanded. The cameras were originally spotted at intersections with traffic lights and appeared to be related to catching red-light violations, although since 2021, they have also begun appearing above roads heading into and out of the capital city. The appearance of cameras follows several discussions in domestic scientific journals of techniques for automatic license plate recognition.

Smartphone-based payment apps are becoming more popular

Citing convenience over other factors, North Koreans appear to be increasingly using smartphone-based payment apps to make cashless purchases in stores and for transfer of small payments to associates. Several competing networks, most run by state banks, offer the service and use is widespread in Pyongyang, according to reports. The expansion of the payment network away from cash will take time, but it gives the state greater insight into the lives of citizens.

A lack of consistent electricity is a key factor in holding back wider deployment

The country's abysmal electricity supply situation will be a major limiting factor in the spread of digital surveillance technology. North Korea has been chronically short of electricity for decades and cannot supply many of its most basic needs. Escapees from rural areas spoke of months with no power, while those from Pyongyang said power was restricted to several hours a day. The little supply the country has is prioritized for factories, leaving many neighborhoods in the dark. For this reason, routine use of surveillance cameras and other technologies that rely on a network connection is unlikely in the short term in many rural areas.

North Korea's existing surveillance and information controls still rely on networks of human intelligence

The state still places a heavy reliance on human intelligence networks that have been built up over decades of surveillance on citizens. The networks can spot more subtle changes in behavior that might signal illicit activities, such as a slight change in the time an individual turns off their lights or an increase in visitors to a house. It is likely that digital surveillance will be additive to North Korea's surveillance of its citizens rather than replace human methods. Digital surveillance is also useful in monitoring the security forces as it is not susceptible to bribery.

Citizens know little about the dangers of digital surveillance

Despite the spread of surveillance technology, citizens know little about how it is used and what it is capable of. Illicit activities happen in North Korea in a grey space where citizens are generally aware of the risk and understand the possibility of getting caught and punished. However, with a widespread lack of understanding of how digital surveillance technologies work, what they are capable of, and how citizens can both encounter and avoid such technologies in their daily lives, it is possible that many North Koreans will be caught engaging in illicit activities before knowledge becomes widespread. In our survey of current residents, some attributed positive aspects to the use of surveillance in residential neighborhoods, such as a reduction in crime.

Methodology

This report is based on extensive, in-depth research carried out by the Henry L. Stimson Center (the Stimson Center, or Stimson) from 2021-2023, drawing on a combination of open-source study, an advisory group of technology experts, semi-structured interviews and a survey.

Stimson staff analyzed, investigated and cataloged a broad range of North Korean media, publications and academic journals regarding the state's digital surveillance and information control. As the country employs a strictly controlled environment, media are the primary means by which the regime manages and shapes its messaging to audiences both at home and abroad. This assessment was employed to better understand the country's current thinking and future intentions and provide North Korea watchers with an informed analysis of the North's digital transformation and its risks.

A virtual advisory group of experts on North Korea and North Korean technology was formed and met regularly throughout the project. Experts were selected based on experience working with closed societies, digital and surveillance technology and familiarity with North Korea to help scope out and guide research, offer feedback throughout the process and review work to ensure proper contextualization of data and high-quality analysis of our research.

Staff conducted 40 interviews with North Korean escapees based in the Republic of Korea (ROK, or South Korea) over the course of two research trips in 2022 and completed an in-country survey of 100 North Korean residents across 10 provinces in 2023 to complement the open-source research and provide as comprehensive a view as possible of citizens' awareness and literacy of digital security, as well as current and future surveillance efforts and technologies. Interviews were conducted both in person and virtually based on availability in English and Korean with audio recordings for qualitative research purposes. Based on previous success with our partner organization, the survey of current residents was conducted in person as well as via phone, messages, and other forms of encrypted communication to ensure the safety of the survey managers and respondents. Because access to North Korea is severely limited, communication with escapees and current citizens is wholly dependent upon networks of individuals with connections to willing participants and those trained to administer questions who are committed to the safety of respondents. As such, capacity and travel constraints meant that staff exchanges with certain groups were limited and required a method of nonprobability convenience sampling of interviewees and chain-referral sampling of survey respondents. Additionally, all interview and survey data in the report has been anonymized due to the sensitive nature of the discussions, in line with the Stimson Center's "Do No Harm" and data security policies.

Chapter 1: Setting the Scene

The Surveillance and Control Landscape in North Korea

Despite guarantees in the country's constitution of freedom of speech, assembly, travel, the press and residence, North Koreans learn from an early age that they have very few freedoms and very little in their lives is private.

To maintain its power, the North Korean state watches and controls citizens through multiple security agencies and bureaus that have a role in all aspects of everyday life.

At the very top is the Ministry for State Security (조선민주주의인민공화국국가보위성), often referred to as the *bowibu* (보위부), which handles serious criminal matters, counterintelligence and other internal security. This includes crimes against the regime, and the ministry operates a network of political prison camps throughout the country.

The Ministry for State Security operates many units that are responsible for different aspects of its work, and when it comes to surveillance, the one most commonly mentioned is Group 109. Agents from Group 109 are often the ones who stop people on the street to check their smartphones; they investigate defections and espionage, and they carry out wiretaps on citizens. The Ministry for State Security is also involved in control of the Internet and rooting out foreign content that has been smuggled into the country.

The Ministry for State Security operates an extensive network of civilian informants that keep watch on the smallest parts of the daily lives of fellow citizens, and transgressions—actual or perceived—are relayed to the organization for investigation.

The Ministry for Social Security is the second major agency that controls and surveils the populace. It was formed in 2020 from the Ministry of People's Security and is akin to the national police agency. With the reformation, the scope of the ministry was reportedly expanded from "persons that break law and order to a degree not fully sufficient to be liable to criminal prosecution" to the wider "institutions, corporations, organizations or citizens that behave unlawfully to a degree not fully sufficient to be liable to criminal prosecution."

There are also other security agencies and bureaus that control and watch over citizens, and a run-in with any of these can result in a fine or getting sent to a labor brigade or prison camp. In serious cases, the state executes people.

Daily Life

When out in public, random ID checks and searches are common. In recent years, these have extended to checks of smartphones, including text messages, to ensure people are not discussing sensitive subjects or even using South Korean slang.

When talking on the phone or with friends, citizens refrain from speaking about topics such as the Kim family, the country's leadership and Workers' Party of Korea (WPK) policies for fear they could be reported.

The danger of being reported comes from other citizens—sometimes friends—who work as informants for the state and from regular telephone wiretapping. North Koreans understand the danger of both and are typically extremely careful about expressing personal feelings towards the state.

The entire North Korean system revolves around a collective belief in and support for the state and Korean Worker's Party, and this is drummed into citizens from a young age and repeatedly throughout their lives with music, culture, books, physical activities, lectures, study sessions and a domestic media that provides little but propaganda.

Workers typically spend the first part of each day discussing articles in the Rodong Sinmun party daily—although praise is the only emotion likely to be heard—and all North Koreans are required to attend indoctrination sessions that occur on Saturday mornings across the entire country.

At home, they live with the constant threat of an unannounced home inspection and search.

When moving around outside the home, permission is required from the state for most journeys beyond a citizen's local area. Special permission is required to travel to Pyongyang or the border region, and additional permission also needs to be secured to stay overnight.

The Ministry of State Security operates a nationwide network of security checkpoints called "No. 10 Checkpoints," through which all passing traffic and travelers must present their identification and permission for the journey. Prior to undertaking a trip, travelers might need to consult multiple parties, such as their company, the Workers' Party representative at the workplace, and the local police, before gaining permission.

The surveillance and control system has been built this way because should international norms like free speech, the right to assemble, and the right to access information be allowed to take hold, they could severely threaten the survival of the North Korean leadership and system.

Illicit Activities

Despite the ever-watching eye of the state, some North Koreans find space to engage in risky activities such as the consumption of foreign media. The techniques they use are varied, but include watching in the early hours or traveling far away from built-up areas where the chance of being caught is low. The intention is to avoid security services and detection equipment that can geolocate people using Chinese smartphones in border regions.

Even with care, consumption of foreign content brings great risks. Reports of executions related to smuggling and distribution of foreign content have been a constant over the decades, but the lull in the mid-2010s appears to have ended. A new law enacted in 2020 spells out death for anyone found guilty of distributing large quantities of foreign media, and reports suggest this is not an idle threat. There have been several reports of executions related to foreign media distribution in 2023.

North Korea's battle against foreign information even extends to the seemingly trivial, with the new law threatening up to two years of labor reform for people guilty of singing or speaking in a South Korean style.

Alongside this severe control in North Korea, China, the country's northern neighbor, has been building up a massive digital surveillance society that relies on the use of advanced technology, such as facial detection and artificial intelligence (AI), to monitor citizens. New requirements mandate presentation of an ID card for tasks ranging from making social media accounts to buying a railway ticket.

Most of North Korea's advanced electronics hardware, especially in the consumer and commercial market, comes from Chinese information technology (IT) suppliers. Some of those companies have already exhibited surveillance products at North Korea's international trade shows, and it appears that Chinese surveillance technology is already in use across North Korea.

The COVID-19 pandemic led to a tightening of the state's control of its citizens. North Korea was one of the first countries in the world to seal its borders in early 2020 and became one of the last to reopen them in 2023. Within a few months of the start of the pandemic, authorities began building a second fence along the country's northern border with China. The fence brought with it additional guard posts, some equipped with electronic surveillance systems, which made smuggling more difficult.

Chapter 2: Biometric Technology Research in North Korea

AT A GLANCE: North Korean state research organizations and universities have been developing software technology for biometric identification since at least the 1990s.

The work began with fingerprint recognition, which North Korea reportedly attempted to sell to law enforcement agencies overseas, and has progressed to facial and image recognition systems. While the country lacks expertise in hardware design, its software engineers are highly talented and have achieved success in several international contests and benchmarking tests.

While much of the early work revolved around the academic sector, an increasing number of commercial enterprises are advertising biometric identification technologies based on home-grown software and foreign hardware.

Research into advanced information technology is undertaken by a variety of state-run research establishments, universities and enterprises.

North Korea lacks a strong base in IT hardware production, but it has high-level software engineering skills. For example, at the International Collegiate Programming Contest in 2019—the most recent year North Korea took part—Kim Chaek University of Technology was ranked eighth in the world, beating teams from Oxford, Cambridge, Stanford and Beijing Universities, the Korea Advanced Institute of Science and Technology (KAIST) in South Korea, and others.

Most hardware is imported from Chinese original equipment manufacturers (OEM), and the importing North Korean company either writes its own software or localizes an existing software package for the device. It will also typically stamp its brand name on the imported product and claim it as its own.

Professors and researchers at North Korean universities can, in theory, pursue any research they desire[1]. However, escapees who have been in the system say that, in reality, the work is heavily influenced by state policies and priorities.

> *Whatever you want to research, you can do freely. However, if you are selected for the national subsidy or support for a research topic by the government, you must do it. We call it myongryong gwaje (*명령과제*).*[2]

The first domestic research on biometric identification technology began in the 1980s and 1990s, according to state media. Amnokgang Technology Development Company (압록강기술개발회사 / 鸭绿江技术开发公) and Korea Computer Center (조선콤퓨터쎈터) began exploring fingerprint recognition use in access control systems for buildings and identification systems for law enforcement.

[1] Escapee interview no. 27.
[2] Escapee interview no. 36.

Both could be useful for state institutions in controlling access to sensitive areas and in control of the populace. In the late 1990s, the country even participated in a tender for a fingerprint-checking system for the Egyptian Police Agency.[3]

Also in the 1990s, the Korea Computer Center was working on voice and speech recognition. In recent years, work has focused on facial recognition and license plate recognition systems, both of which have clear surveillance purposes.

Fingerprint Recognition

The earliest reported work began in the 1980s at Amnokgang Technology Development Co., which attempted to make a business in exporting fingerprint identification systems in the 1990s.

The company makes the unlikely claim that it developed the first fingerprint-based entrance device in the world in 1988. It is unclear whether that is true, but it claims it won prizes for its biometric identification products at the 22nd Geneva Salon in 1994. The Salon International des Inventions de Genève (International Exhibition of Inventions Geneva) is an annual exhibition of global inventions.

The organizers confirmed a gold medal was awarded in 1994 to "Li Sung Guk" for an "Access control system with fingerprint recognition. Useful for safes, confidential documents archives, banks, hotels, private vehicles, and military units, thanks to its high speed of verification and reliability of identification."

However, the organizer's records identified Li as a South Korean inventor, it said.

Images published by Amnokgang Technology Development appear to show a certificate related to the 1994 award, others from 1990 and 1991, and an unidentified Chinese certificate.

The image is too small to make out any details about the certificates beyond the titles. The organizers of the Geneva expo said they had no record of Li Sung Guk winning earlier awards, although they note products could have been registered under a company name rather than an individual.

The fingerprint lock was also displayed at a security equipment exhibition in China in 1996, according to the profile, but no details of the lock have been published. While most company profiles published by state media omitted this detail, one published in 2018 said the lock was developed with a Chinese company.

A 2002 profile of the company says it had developed several products utilizing fingerprint recognition, including computer security software, a smartcard with fingerprint ID and a fingerprint-based lock. Further, it said the products had been sold overseas in China, Japan and Nigeria.

Also in 2002, a presentation of the company's products on a North Korean website said its fingerprint recognition products were divided between those for use by the police and those for civilian applications.[4]

[3] "The Status and Prospects of North Korea's Computer and Information Industry," *Tongil Kyongje*, April 1998.
[4] Online Software Expo, *Pan Pacific Economic Development Association of Korean Nationals*, December 2002.

Figure 1.
Staff of Amnokgang Technology Development Company show off the company's biometric ID devices in a feature in DPR Korea Magazine in 2021. (Source: DPR Korea Magazine)

Figure 2.
A close-up of the certificates shown in the DPR Korea magazine article. (Image: DPR Korea Magazine)

In parallel with the work at Amnokgang Technology, the Korea Computer Center (KCC, 조선콤퓨터중심 / 조선콤퓨터쎈터) was also working on development of fingerprint recognition in the 1990s. It had a system available in at least 1999, according to a report in the Foreign Trade magazine.[5]

The center, which at the time was North Korea's top software engineering center, developed a number of biometric software programs, including an "automatic fingerprint identification system," according to the magazine. It did not detail the software, but a second profile in the People's Korea newspaper in 2001 said KCC had developed fingerprint verification software called "FVS-P."[6]

[5] "Korea Computer Center," *Foreign Trade* 2, (1999): 2-3.
[6] "Korea Computer Center," *The People's Korea*, February 8, 2001.

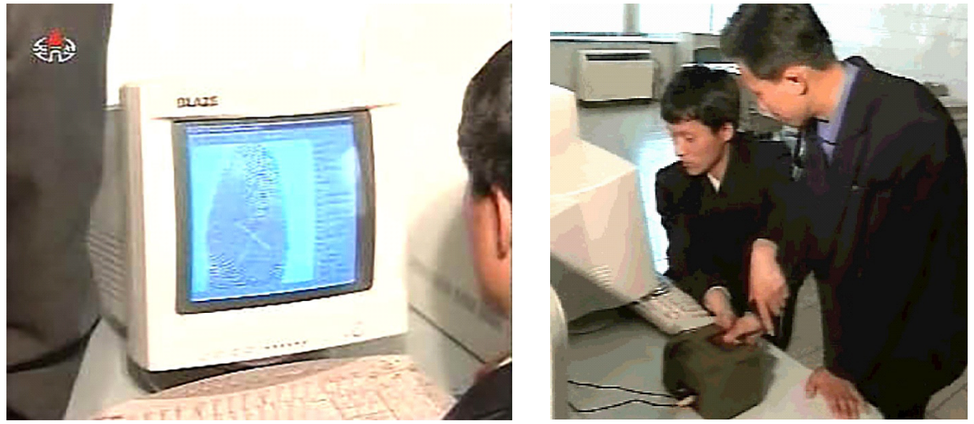

Figure 3.
Fingerprint Recognition work at Korean Computer Center. (Source: Korean Central Television on May 8, 2001)

Three months later, KCC was profiled on state television. Several software applications were detailed, including a fingerprint entrance control system. The system is capable of scanning 300 people per second, according to the report.[7]

At around the same time, an online exhibition of North Korean software by a Chinese organization called the Pan-Pacific Economic Development Association of Korean Nationals detailed a KCC fingerprint identification system called "KAFIS-90."[8]

The profile said it could be used for "large scale identification checks"—a clear nod to one of the motivations behind its development.

The KAFIS-90 system was a follow-on to a system for law enforcement called "AFIS2000." No other details of the AFIS system were published.[9]

North Korean state media has not covered fingerprint recognition work in recent years, probably because the software has matured to an acceptable accuracy and work has moved into other areas.

Voice and Speech Recognition

Voice and speech recognition can recognize and transcribe speech and conversations. It has legitimate commercial uses, such as voice control of equipment or automatic transcription of speeches, but it also has significant potential to be used for surveillance, such as monitoring phone calls for keywords.

[7] *Korean Central Television*, May 8, 2001.
[8] Online Software Exhibition, *DPRKorea Infobank*, May 2002.
[9] Ibid.

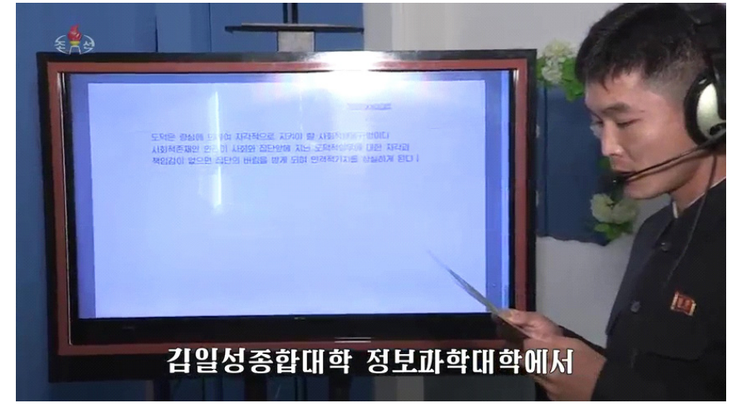

Figure 4.
A researcher from Kim Il Sung University demonstrates a speech recognition application. (Source: Korean Central Television on November 3, 2018)

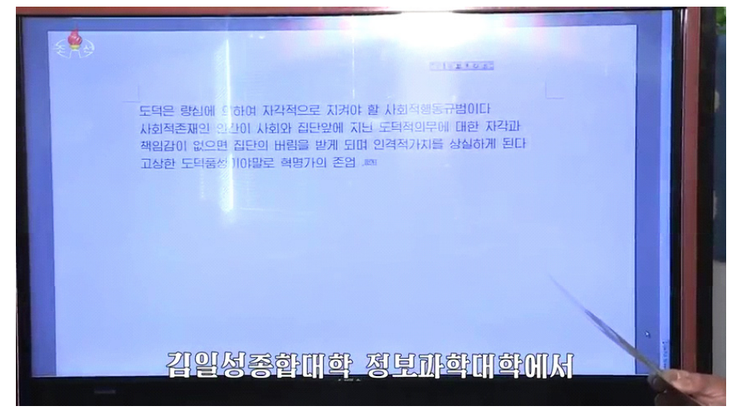

Figure 5.
A close-up of a speech recognition application developed by Kim Il Sung University. (Source: Korean Central Television on November 3, 2018)

Work on voice and speech recognition began at the Korea Computer Center in the 1990s, at a time when voice control of personal computers was seen as futuristic. As with other software developed during this period, the country made several attempts to commercialize and sell it overseas.

At the World PC Expo in Tokyo in 2001, several packages featuring software from the country were on display. These included DigiEar, described as a voice recognition program for security-related applications; Hana, for recognizing numbers spoken in Japanese, English and Korean; and Chilbosan, which was voice recognition for Korean.[10]

[10] "DPRK to Enter World PC Market," *The People's Korea*, October 5, 2001.

Today, some of the country's leading research is taking place at Kim Il Sung University's Information Science Institute. In a 2018 university journal, researchers disclosed a method of training an artificial intelligence model to recognize Korean speech.[11]

In November 2018, a software package developed by engineers from Kim Il Sung University's IT Institute was shown in use during a state television report on the institute's work.[12]

More recently, researchers published a paper that describes a method for better understanding conversational and colloquial spoken Korean.[13]

The extent to which speech recognition is used for surveillance in North Korea is not clear, although there is clearly the potential for it to be employed for automated recognition of telephone calls. The tapping of phone conversations is common in the country.

Palm Recognition

Palm recognition technology can be divided into two broad areas. One is an extension of fingerprint recognition and involves the entire palm print, while the other uses infrared light to detect the pattern of veins inside a person's hand.

Of these two, vein detection has higher accuracy but requires a live palm to be present, while palmprint, like fingerprint, can be used after the fact as an investigative tool.

In North Korea, work on palm print recognition technology has been underway since at least 2011. The fourth quarter edition of the Information Science journal that year contained a paper in the research data section (연구자료) on palm print research.[14]

Further papers were published in 2013, and in June 2018, the Mathematics Department of Kim Il Sung University submitted benchmarks for its palm print recognition software, measured against sample palmprints provided by the Fingerprint Verification Contest at the University of Bologna, Italy.

Kim Il Sung University scored well, and its June 2018 benchmark results remain at number three on the partial benchmark ranking and number five on the full benchmark ranking in July 2023. It is the highest-placed university group in the ranking.[15]

[11] "조선어품사정보를 리용한 요소재귀신경망언어 모형구축에 대한 연구," Kim Il Sung University Journal of Information Science, no. 4 (2018): 50.
[12] *Korean Central Television*, November 3, 2018.
[13] "조선어자연발화음성인식에서 토의 생략과 어순바꿈을 모방한 입말체본문코퍼스의 생성방법 (A Method for Constructing Colloquialism Corpus Imitated by the (Particle) Omission and Anastrophe for Korean Spontaneous Speech Recognition)," *Kim Il Sung University Journal of Information Science*, no. 4 (2022): 9.
[14] Zernike, "모멘트를 리용한 손바닥문양인식의 한가지 방법 (A Method of Palmprint Recognition Using the Zernike Moment)," *Information Science*, no. 4 (2011): 39.
[15] Fingerprint Verification Contest results, https://biolab.csr.unibo.it/FvcOnGoing/UI/Form/PublishedAlgs.aspx.

The fourth quarter 2020 edition of the Information Science journal carried details of two research projects on palm print identification.[16]

The first paper was described as "a method for extracting key palmprint information more safely and reliably as the first stage of the palm information-based biometric authentication."

State media first mentioned the more accurate palm vein technology in November 2017 when it was on show at the 28th National Exhibition of IT Achievements.

The Korean Central News Agency said exhibits included a "self-contained vein discriminator, which recognizes the arrangement of finger blood vessels."

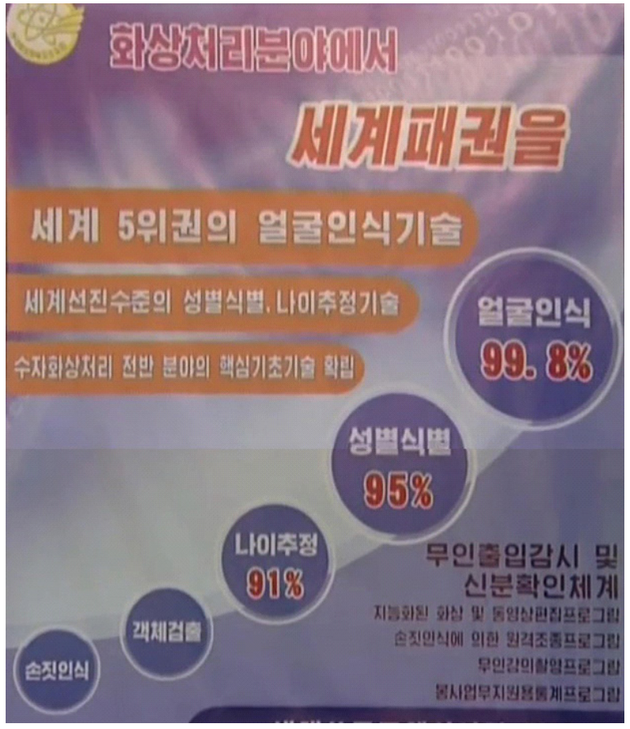

Figure 6.
A poster at the Kim Il Sung University booth at the 2016 Exhibition of IT Successes.
(Source: DPRK Today; composite by Martyn Williams)

[16] "손바닥정보에 기초한 인증체계에서 주목령역 추출의 한가지 방법 (Method Of Extracting Information from Focus Areas on the Palm as an Authentication System)," *Information Science*, no. 4 (2020): 50; and "령역추출과 최대내접원계산에 기초한손바닥추출의 한가지 방법 (One method of palm extraction based on region extraction and maximum inscribed circle calculation)," *Information Science*, no. 4 (2020): 51.

While palm print recognition is used by law enforcement agencies, palm vein has wider use in the security and authentication field. The pattern of veins inside is unique and remains the same over a lifetime, making the system highly effective as a form of biometric identification, so much so that palm vein ID is used in bank automated teller machines (ATMs) in some countries to authenticate customers.

Most recently, 2021 and 2022 profiles of Amnokgang Technology Development Company claimed the company had developed a vein identification device, although they offered no further information.

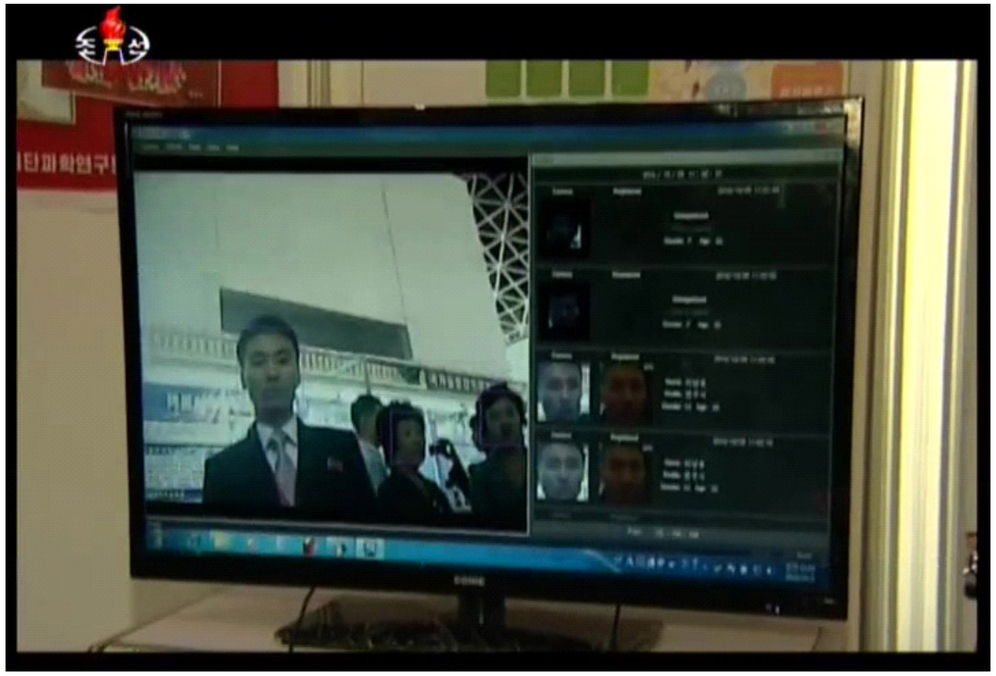

Figure 7.
The Kim Il Sung University facial recognition software at the 2016 Exhibition of IT Successes in October 2016. (Source: Korean Central Television)

Facial Recognition

Domestic development of facial recognition technology has been going on for at least a decade. It began at the State Academy of Sciences (조선민주주의인민공화국 과학원), which undertakes basic-level scientific research and development that advances national priorities. It appears that the state had identified facial recognition as a replacement for existing identification technologies.

The first time the work was mentioned in state media was in a 2014 report that detailed the work of the academy and how it was superior to fingerprint technology in security applications. The report said the academy's Mathematics Institute, which had been involved in the development of fingerprint recognition technology earlier, was working on facial recognition and it was "regarded as better than widely used smartcard and fingerprint identification technology."

Two years later, the IT (Information Technology) Research Center of Kim Il Sung University's Advanced Science Research Institute (김일성종합대학 첨단과학연구원 정보기술연구소) demonstrated a prototype facial recognition system at the 2016 Exhibition of IT Successes in Pyongyang.

A poster displayed alongside the working demonstration said the facial recognition technology was ranked fifth in the world, and it featured "world-class" gender recognition and age estimation technology. Facial recognition accuracy was given as 99.8 percent, gender recognition as 95 percent, and age estimation as 91 percent. It also featured object detection and hand gesture detection.

A state television report on the exhibition showed the software in use and running on a laptop computer.

The use of facial recognition systems appears to be growing in North Korea, and several companies have advertised what appear to be working systems. These are discussed later in this report.

Chapter 3: State Collection of Biometric Data

AT A GLANCE: The path of a North Korean's life is largely shaped by data held about them and their family by the state. Citizens have little freedom to determine their own destiny, with detailed family history data playing a role in where they can live, go to school, where they work and the role they can play in society.

As such, the ability of the state to verify each person's identity is important, and our research shows a major effort to move beyond easily forged paper ID cards to electronic ones based on biometric data. At the same time, there is evidence that family record data is also being computerized.

The impact is that it will become increasingly difficult for citizens to make use of fake documents and increasingly easy for security services to instantly verify the identity of citizens and their backgrounds.

To accomplish the control it exercises over its citizen's lives, the North Korean state holds a large amount of information on every North Korean.

One of the principal databases is the residents register maintained by local and provincial branches of the Ministry of Social Security. Each citizen's register includes basic personal and demographic details, such as their name, date of birth, details of education, jobs and job changes, and relationships with other family members. Perhaps most importantly, it also includes the person's *songbun* (성분).

The *songbun* system divides North Koreans into three main classes: loyal, wavering, and hostile, based on their perceived loyalty to the state. It is based on the actions of several generations of family members, so even if a citizen is loyal to the state, they may be classified as hostile if their grandfather attempted defection many years ago. There are approximately 50 subcategories in the *songbun* system, and where someone falls directly influences their access to education, the types of jobs they can take and where they can live. It is one of the fundamental pieces of information on every citizen.

As state records have a massive impact on a person's life, access to the citizen's register and other databases is tightly controlled to prevent illicit changes to the data, according to an interviewee who worked in a regional police records office around a decade ago.

> *Other people working in other departments, even within the city police office, cannot have free access to this document. There is a reception room, and behind the reception room, there is a special archive area that keeps these documents. They're in a locked area, and they have physical keys. So, people cannot have free access to these documents. And even if a department head wants to see the document, he needs to write his name and sign a paper, and then he could be given the physical document. After they return it, they have to check it once again to verify if there have been any changes. This is done manually. And finally, staff working in the office don't have access to their own information. They have to go through other offices.*[17]

[17] Escapee interview no. 13.

At the time, much of the information was recorded on paper, but a computerized database had been introduced that contained residency information and photographs of citizens of the city.

Citizens did not have access to their own records, making it impossible to see what data the state had stored about them.

> *If somebody's family member needs to do something, and the family members have heard some gossip or rumors of the deeds that they have done in the previous generations, they would come and ask, "I heard that, these are some of the rumors I heard, is this true?" Ordinarily, the majority of the citizens do not really care about their family information and family history. But there were people who just came up boldly and said, for instance, "My son is very handsome, very good-looking, so I want them to get into a special military unit," but they were told that he's not allowed because there were some deeds that had been written in the family document, and they want to check this out in person. They cannot be shown because the law prohibits showing these to the public.*[18]

But rumors of the state's access and records of information abound.

> *I heard that facial recognition, cameras and CCTV identify all human movements and find criminals or people who have crossed the Yalu River.*[19]

Identification Cards

When they reach the age of 17, all North Koreans are issued with national identification cards. There are two main types: one issued to residents of Pyongyang and one to all other citizens.

The issuance of identification papers is conducted by the police and coincides with the creation of a police record on each citizen, which reportedly includes information not present on the ID card, such as their *songbun*.

For many years, the ID cards were made of paper and reissued every 10-15 years.

The ID cards were printed on a special paper, which was controlled by a single person. A different person controlled the printing process, making it impossible for a single person to produce an ID card, according to the interviewee. The system was supposed to prevent fake ID cards from being produced, but some people did manage to obtain them, said the interviewee.[20]

In 2010, reports emerged from the country that new cards to replace those issued in 2004 would come early, and a subsequent report in 2012 said the new cards would contain a microchip. This was likely due to the state wishing to make the issuance of fake ID cards more difficult.

For whatever reason, the new cards were delayed, and it was not until 2018 that citizens in Pyongyang began receiving them. Cards issued to Pyongyang residents are not technically national ID cards but Pyongyang Resident Cards, but they serve the same purpose.

The new cards containing microchips were rolled out to the rest of the country in 2019.

[18] Ibid.
[19] In-country surveyee, Ryanggang no. 1. "CCTV" refers to closed-circuit television.
[20] Escapee interview no. 13.

Obtaining the cards is reportedly mandatory, and citizens need to provide fingerprints, be photographed and take a blood test when obtaining them. Those requirements mean the state collects the fingerprint, facial and DNA data on every North Korean citizen.

What it does with this mass of biometric data is unclear. The photograph might just be stored on the card and not used as part of a facial recognition system, and the blood data could be used to determine blood type and not a DNA profile.

No matter how it is used, the possibility remains that a detailed biometric profile of all citizens could be created with the data.

The new cards have the holder's personal information, including name, date of birth, gender, marital status, nationality and blood type, and printed on the plastic card alongside a photo of the holder.

Additionally, a report said the new cards will be reissued every eight years. This makes the ID card system a way to regularly count the entire population and detect if anyone is missing from the country, as citizens are required to collect their cards. The renewal process also helps verify that people are living in their registered areas.

North Koreans are required to show their ID cards at state checkpoints and in many interactions with authorities. The move to the new system means the country is either already running or planning to run a national electronic citizen database.

Chapter 4: The Proliferation of Surveillance Cameras

AT A GLANCE: Surveillance cameras are proliferating in North Korea as both a way to improve security and to prevent theft. Most, if not all, of the cameras are sourced from Chinese vendors, and features run from basic video feeds to more advanced units capable of feeding facial recognition systems.

The spread of CCTV further threatens the ability of North Koreans to avoid surveillance. However, it is unclear the extent to which camera footage is stored or pooled and centrally accessible. The poor electricity situation and low network connectivity will hamper the ability of the state to build a surveillance network comparable to that operated in China.

Video surveillance cameras appear commonplace in all levels of schools in Pyongyang and prominent cities across North Korea. The cameras feed images to a central location and allow staff to remotely monitor what is happening in each classroom.

The positioning of the camera and nature of the North Korean system of surveillance make it likely that the cameras are just as much about monitoring the teacher and what they are saying to children as they are about monitoring the behavior of the children.

Video surveillance of workplaces is also widespread and appears to be done for several reasons. Many factories use CCTV cameras to remotely monitor machinery and production processes, but the systems are also in place to prevent theft by workers.

A rare sight just a decade ago, video surveillance is becoming more common in North Korea, but compared to other countries, a unique set of circumstances influences when and where it is used.

Cameras today appear commonplace in government buildings, workplaces, industrial establishments, schools in Pyongyang and along North Korea's border with China. The cameras are often visible in state media coverage in some public areas, such as streets, shops and on the front of buildings.

In our survey of current North Korean residents, about half of all respondents said they had seen surveillance cameras. Locations mentioned included government buildings, security agencies, and a university research lab where cameras were installed on "every floor."[21] Several respondents stated cameras are installed "everywhere" in factories, particularly those manufacturing military equipment, which are "always monitored."[22]

However, in our interviews of escapees, most of whom left the country before 2020, few reported such widespread use of surveillance cameras, indicating the number of devices has risen in the last few years.

But they do not appear to be universal yet.

[21] In-country surveyee, Pyongyang no. 6.
[22] In-country surveyees North Hamgyong no. 4, Gangwon no. 6 and North Pyongan no. 1.

Figure 8.
A CCTV Camera (circled) outside a pharmacy in Pyongyang.
(Source: Korean Central Television on May 16, 2022)

One interviewee who lived in Pyongyang before leaving North Korea in 2015 said cameras were not common in residential areas.

> *CCTV was not set up in residential areas. They are normally set up in major agencies, public agencies, and government buildings. I think it's because of the electricity supply. It's not stable, so they couldn't set it up in a wider area.*[23]

Several interviewees cited the lack of electricity as the reason security cameras had likely not been installed more extensively. Some from rural towns said their neighborhoods only received electricity a handful of days a year, so running any surveillance system that required a consistent electricity supply was impossible.

While several years have passed since some of the interviewees left North Korea, the electricity situation does not appear to have progressed significantly in several decades.

Another factor influencing their use is the existing human-centered security system in the country. The current *inminban* approach, which divides neighborhoods into groups of 20-40 households and has a leader watch for suspicious activity and changes in schedule or lifestyle, is likely more effective at picking up on small signs of wrongdoing, such as a change in schedule, than a camera.

> *People just monitor each other. For example, we have an inspector for every 20 to 30 people. So, they used to come in a very covert fashion, but nowadays, they are acting more openly. At the workplace, there is also people-to-people surveillance. The state security department also sends an inspector to workplaces to conduct covert surveillance. But basically, the monitoring is done by individuals, not CCTV technology.*[24]

[23] Escapee interview no. 26.
[24] Escapee interview no. 2.

In public, the level of street surveillance by CCTV, even in central areas, does not appear to approach that of China or South Korea, where cameras can be seen at most intersections. This is also likely due to the large number of security agents that monitor and control public life, especially in Pyongyang.

However, the country appears to be heading toward a future of more pervasive and sophisticated video surveillance. Research and development work at North Korean universities and establishments has been focused on features such as movement detection and facial and license-plate recognition for some years.

For North Koreans, the spread of CCTV means even greater surveillance of their lives, especially if the cameras include automatic detection systems. If such cameras become more broadly used, citizens involved in illicit activities would be especially at risk as facial detection could track their movements throughout cities.

At present, North Koreans who get caught in activities such as smuggling or distributing illegally imported goods and foreign content can bribe local security services, but, unlike humans, security cameras cannot be bribed.

> *CCTV cameras are not for the safety of the public.*[25]

> *CCTV cameras help catch thieves and criminals, but they eliminate secrets among people.*[26]

If feeds from cameras are sent to a monitoring station, bribery could be much more difficult because the guards could fear they are being watched. Indeed, this appears to be part of the motivation for their installation.

One interviewee, a former soldier who worked at a road checkpoint, knew cameras had been installed. He was not aware if the cameras were remotely monitored, but they and their fellow soldiers still made sure to keep out of their view if they were doing anything that might get them into trouble.

> *We knew the blind spots of the CCTV, so we'd check IDs in the area where the CCTV was filming. Then, even if all the things were right with the IDs, we would bring them to a blind spot and then we would take the bribe.*[27]

In North Korea, where everybody watches everybody else, the growing use of surveillance cameras in some locations, particularly along the border and in storage depots, might be as much about supervising security officers as monitoring citizens.

The China Connection

Like most IT hardware used in North Korea, many security cameras—if not all—likely come from Chinese equipment suppliers. While North Korea has limited electronics manufacturing capability, it is not believed to possess the ability to make highly integrated electronics products, such as surveillance cameras, at scale.

[25] Escapee interview no. 20.
[26] In-country surveyee, Jagang (Chagang) no. 3.
[27] Escapee interview no. 24.

Trade in cameras started as early as 15 years ago. A 2013 South Korean media report citing Chinese customs data said North Korea had imported at least 100,000 CCTV cameras between 2009 and 2012.

Hangzhou Hikvision Digital Technology Co. Ltd. (浙江海康信息技术股份有限公司), was identified as a key supplier to North Korea in a 2019 report. Hikvision is one of the world's largest suppliers of surveillance cameras, and its systems are extensively used by the Chinese government.

The report identified Hikvision software in use at the Rason Drinks Factory (라선음료공장), the Ryomyong Elementary School (려명소학교), the East Pyongyang Middle School No. 1 (동평양제1중학교) and Huchang Mine Power Station (후창광산발전소).

Figure 9.
Security cameras on show at the 2018 Exhibition of IT Successes in Pyongyang.
(Source: DPRK Today website)

Figure 10.
A close-up of the Phurunhanul camera and a similar camera available from Chinese electronics vendors.
(Images: DPRK Today and Aliexpress)

In most cases, the cameras are imported by a North Korean intermediary company that applies its brand name and packages them with software developed in North Korea. One such company is Phurunhanul ("Blue Sky," also written as Phurun Hanul) Electronics.

At the 2018 Exhibition of IT Successes in Pyongyang, Phurunhanul Electronics showed a complete surveillance monitoring system. Alongside the lenses, most of the cameras appear to contain at least infrared lighting for night vision purposes and possibly other sensors.

The supplier of the cameras to Phurunhanul is not clear, although at least one of the cameras bears an almost identical resemblance to a camera available on Chinese online trade marketplaces.

Use of Surveillance Cameras in Schools

In the last few years, CCTV cameras appear to have gone into widespread use in schools in Pyongyang and other major North Korean cities. In numerous state television reports on schools, cameras are often visible mounted on walls or ceilings. The reports tend to focus on better schools in larger cities where access to electricity is less of a problem than in rural areas. On occasion, when rural schools are featured on television, cameras have not been observed.

Typically, the cameras appear to be mounted on bases that allow panning and tilting so they can be remotely controlled to be pointed in any direction. They are often towards the rear of a classroom or midway along the wall, suggesting that they are designed to surveil the entire classroom, including the teacher, rather than just the students.

Cameras have been observed at all levels of school, from kindergarten to high school. They can also be seen in some university lecture rooms.

The cameras are a way for the headteacher or other officials to monitor what is happening in each classroom. The camera mounting locations allow observers to get a view of all students and, perhaps more importantly, a view of the teacher and whatever materials they are presenting to the class.

Figure 11.
A CCTV camera mounted on the wall of Ryusong Junior Middle School (류성초급중학교) in Pyongyang, seen on Korean Central Television on April 2, 2022.

Figure 12.
A camera on the wall of a classroom at the Pyongyang Elementary (Primary) School No. 4 (평양제4소학교), seen on Korean Central Television on July 30, 2022.

Figure 13.
A camera in a classroom at Undok Kindergarten (은덕유치원) in Phyongsong, seen on Korean Central Television on March 9, 2022.

A visit to the Pyongyang Teacher Training College (평양교원대학) by foreign reporters in 2018 found cameras in every room they visited, and a representative confirmed the purpose of the remote monitoring system.

> *The principal can not only observe classes in person[,] but they can also do it in their own room through the cameras…that way, they can monitor and evaluate all the teacher's good and bad work, which can lead to better supervision.*[28]

On several occasions, state television broadcasts have captured monitors displaying feeds from multiple classrooms, such as this image from Segori Junior Middle School (세거리초급중학) as part of a report on new education laws.

[28] Escapee interview no. 15.

Figure 14.
The headteacher of the Segori Junior Middle School, alongside a monitor showing feeds from cameras in classrooms, shown on Korean Central Television on December 27, 2021.

Figure 15.
A close-up of the screen displaying footage from numerous security cameras, shown on Korean Central Television on December 27, 2021.

The camera system appears to be based on a domestically developed piece of software.

At Kim Jong Suk Middle School No. 1 in Pyongyang (김정숙제1중학교), staff can view a bank of monitors that displays feeds from multiple classrooms, according to footage broadcast on Korean Central Television on November 8, 2019.

Figure 16.
A bank of monitors showing CCTV images at Kim Jong Suk Middle School in Pyongyang, seen on Korean Central Television on November 8, 2019.

Surveillance Cameras in Workplaces

Security cameras appear to be widely deployed in workplaces in North Korea. Many large factories have a control room where feeds from the cameras are visible on monitors.

In industrial establishments, this most often appears to be a way to remotely monitor equipment and processes, such as this screen at the Chonnae-ri Cement Factory (천내리세멘트공장), also translated as Chonnae-ri Cement Plant) near Wonsan. Various machinery along the production process is visible on the screens alongside details of plant operations (pixelated by state television).

Figure 17.
The control room at Chonnae-ri Cement Plant, seen on Korean Central Television on May 25, 2021.

Footage broadcast in 2022 showed railway workers looking at a feed of multiple cameras across what appears to be railway lines and junctions. The screen had feeds from 25 cameras, and a panel on the left of the screen indicates it's one of over 25 banks of cameras available through the software.

Figure 18.
Multiple camera feeds across railway lines and junctions, seen on Korean Central Television in 2022.

One of the most impressive industrial monitoring systems is at the Ryongbong School Supplies Factory (룡봉학용품공장, also translated as the Ryongbong School Things Factory) in the west of Pyongyang, where a large video wall displays feeds from multiple cameras.

Figure 19.
The control room at the Ryongbong School Supplies Factory, seen on Korean Central Television on February 7, 2022.

Figure 20.
The control room at the Ryongbong School Supplies Factory, seen on Korean Central Television on February 7, 2022.

In the image above, the screen on the left says Ryongbong School Supplies Factory Integrated Production System (룡봉학용품공장 통합생산체계, also written as the Ryongbong School Supplies Integrated Manufacturing System) along the top.

Below it is a series of tabs that read: Process Management (공정관리), Schedule Management (일정관리), Resource Status (자원상태), Energy Management (에네르기관리), Quality Management (품질관리), Production Analysis (생산분석) and Production Site (생산현장).

On the screen below are three rows of three cameras each. The top row is labeled Final Inspection Site 1, 2 and 3 (사출현장), the second row is labeled Assembly Site 1, 2 and 3 (조립현장), and the bottom row is labeled Pencil Site 1, 2 and 3 (연필현장).

The screen in the background of the image shows the same camera feeds.

The label on the bottom of the monitor in the foreground reads Sunflower (해바라기), which is likely a brand name but could refer to the name of the production monitoring system.

As part of a feature on technology use in agriculture, a screen of camera feeds from around a farm was shown in a state TV report in April 2023.[29]

Figure 21.
Camera feeds placed around a farm, seen on Korean Central Television in April 2023.

Figure 22.
Close-up of security camera feeds placed around a farm, seen on Korean Central Television on April 17, 2023.

[29] *Korean Central Television*, April 17, 2023.

A closer look at the screen shows cameras are mostly outdoors, displaying scenes around the farm and its buildings. The image on the top left of the screen shows the area around a monument to the Kim family, and is almost certainly there for security purposes. The views from the other cameras would also appear to suggest they are intended to monitor the movement of personnel and serve as a potential deterrent to theft.[30]

Other Uses of Surveillance Cameras

Use in Public Spaces

Cameras can be found outdoors in some areas of North Korea, although it is unclear how widespread they are. Our research was unable to find evidence of widespread use.

> *Cameras are installed on the streets and buildings, so even when people are monitored, and civil identification cards are censored, they are identified only by face-to-face contact.*[31]

One interviewee told us they saw cameras around areas where large gatherings or assemblies are held, such as Kim Il Sung Square in Pyongyang, but cameras were not common across the entire city.

> *It's not for public safety purposes, but because you can see people who would hinder these assemblies or large gatherings, it's for the state to block them in advance to prevent these people from messing up these assemblies and gatherings.*[32]

Figure 23.
A camera on the exterior of Pyongyang Station, seen on Korean Central Television on November 9, 2021.

[30] "I saw CCTV is installed in large factories to prevent theft," Escapee interview no. 40.
[31] In-country surveyee, Ryanggang no. 3.
[32] Escapee interview no. 19.

Forestry Surveillance

Cameras have also been set up in rural areas to keep watch for forest fires, according to North Korean media.

In June 2021, North Korean TV broadcast a feature on rural affairs and included shots of a CCTV camera tower in an undisclosed location.

Note that forestry cameras are one of the options available through the Naenara video database described earlier in this section.

Figure 24.
A CCTV camera tower, seen on Korean Central Television on June 10, 2021.

Figure 25.
A rural CCTV camera, seen on Korean Central Television on June 10, 2021.

Personal Use of Security Cameras

Some North Koreans have been able to get hold of security cameras and install them at home, according to our interviews and survey.

Two interviewees tied the use of cameras to comparatively wealthy families who traded goods and had large amounts of money at home, while another interviewee said they were commonplace in the capital city and used to provide enough warning to hide any illicit material during home inspections.

> *Those households who are in [the] trading business and have a lot of cash, the rich families would have CCTV in their house, but normal houses won't have CCTV.*[33]

> *In personal homes, they buy CCTV themselves. They want to know if the police are coming or not. So, in the streets and alleys in front of your home, you would set up a CCTV, and you can monitor whether the police or the inspector is coming. And then, you can hide everything. This is very widely done in Pyongyang.*[34]

In July 2023, Daily NK reported that residents of Hyesan had been ordered by authorities to take down their personal cameras. The article suggested that the cameras had been installed so that residents could identify who was coming to their front door to get advance warning during crackdowns by the authorities on consumption of foreign content. It said some users of foreign mobile phones used them to get early notice of home inspections and to provide more safety while they used the phones. The report did not detail the cameras in use or how they connect. Many security cameras operate over Wi-Fi but also need to contact a central Internet server—something that is likely unavailable for North Korean users. It is possible the cameras have a simple direct video connection to a television inside the house.

> *The families that are a bit better off here have all installed security cameras. You can find people selling them at pretty much every market.*[35]

[33] Escapee interview no. 8.
[34] Escapee interview no. 19.
[35] In-country surveyee, Pyongyang no. 6.

Chapter 5: Road Traffic Surveillance

AT A GLANCE: Surveillance cameras above roadways began appearing in Pyongyang around 10 years ago. Based on their location and observations by international visitors, the cameras appear to have been first used to catch cars running red traffic lights. The network expanded across Pyongyang over subsequent years, and in 2017, the first cameras began appearing in other cities.

In 2021, during the COVID-19 pandemic, when North Korea was tightening control of citizens, the network appears to have expanded to major roads heading into and out of the capital. In this case, the cameras are not associated with traffic signals.

North Korean scientific journals have carried several papers on license plate recognition techniques since 2019, so it is likely that the camera network is being employed to automatically record the license plates of passing vehicles.

In the last decade, a video surveillance network has grown from a few intersections in Pyongyang to multiple points across the city and other major cities in the country. The purpose of the network is unclear, although its growth has coincided with a research project at Kim Il Sung University into license plate recognition. Most recently, it appears that the cameras, which had been centered around intersections, are expanding to cover other major roads.

The cameras first began appearing at major intersections in Pyongyang in 2014. They appear to be accompanied by strobe lights and radar detectors in an arrangement that suggests they might be used to catch drivers who jump red lights. A foreigner who had spent considerable time in Pyongyang said he had witnessed the strobes flashing at an intersection.[36]

The appearance of the cameras came around the same time that many of Pyongyang's iconic "traffic ladies" disappeared from the streets to be replaced by traffic lights. Private ownership of cars is extremely low in North Korea, and the country tightly controls the ability of its citizens to travel freely, so traffic on North Korean roads is light by global standards but has been steadily rising over the last decade, according to visitors.

[36] Confidential interview conducted in 2022.

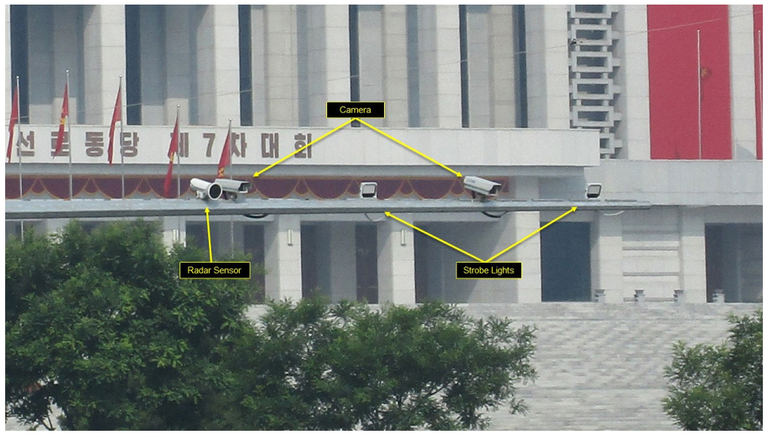

Figure 26.
Cameras, strobe lights and a radar detector outside the April 25 House of Culture photographed on May 27, 2016. (Source: Mehdistt, cc-by-sa. Annotation by 38 North)

Figure 27.
A traffic camera and strobe light on a structure in Pyongyang at 39° 1'13"N 125°44'5"E, seen on Korean Central Television on February 16, 2021. (Annotation by 38 North)

In 2014, the cameras appeared to be in use at just five junctions near Kim Il Sung Square in Pyongyang and expanded to more intersections in Pyongyang in the following years.

The cameras are placed on poles above the road, approximately 25 meters ahead of each junction. They face the direction of travel, so they capture the rear of vehicles. This arrangement further suggests they are intended to capture license plates and not an image of the driver.

In 2017, the first cameras appeared in Chongjin; in 2018 in Phyongsong, and in 2019, they appeared in Hamhung. During the same period, they continued expanding in Pyongyang, so by the end of 2019, at least 42 intersections in the capital had cameras.

Figure 28.
Modern intersection layout in Pyongyang with traffic cameras ahead of the junction and horizontally mounted traffic lights. (Copyright © 2020 Maxar. Annotation by 38 North)

It was around this time that the first signs of a possible wider monitoring and surveillance use appeared. Rather than being placed around intersections, structures similar to those used to mount cameras began appearing on highways around Pyongyang and on side streets, feeding into major roads, according to commercial satellite imagery.

Four examples are included on the following pages. The images are not detailed enough to determine if CCTV cameras are mounted on the structures, but they are similar to the camera mounts and do not appear to carry larger visible objects such as road signs or lights.

One such structure is about 650 meters north of the former Arch of Reunification in Pyongyang, where traffic from the Pyongyang-Wonsan motorway and Pyongyang-Kaesong motorways come together on the approach to central Pyongyang.[37] It appeared in late 2021 or early 2022 and is at 38°58'14"N 125°43'4"E.

A similar structure appeared in 2020 over the outbound lanes on the Pyongyang-Hyangsan Motorway (평양-향산관광도로) at 39° 6'28"N 125°44'21"E.

[37] The monument was demolished in January 2024.

Two structures are also visible above the Pyongyang-Nampho Road (also known as the Youth Hero Motorway, 청년영웅도로) at 38°59'12"N 125°39'21"E. In this case, one each is above the inbound and outbound lanes.

Inside Pyongyang, the structures have appeared on some roads that feed traffic into larger roads. For example, further along the Pyongyang-Nampho Road, a similar structure has been erected on an outbound lane from Pyongyang and a lane that feeds into the road. No traffic lights appear present at the junction.

Figure 29.
A structure over the Pyongyang-Wonsan Tourist Motorway (평양원산관광도로), seen in a satellite image from April 14, 2023. (Source: Google Earth. Annotation by 38 North)

Our research has identified at least 20 locations where such structures are present. Many sites are on major highways, important thoroughfares in Pyongyang and the roads that feed into them.

Among areas where the cameras do not appear to have been installed are highly sensitive areas of Pyongyang, such as around Kim Jong Un's office or the offices and residences of top officials of the KWP. This is likely because security in the areas is already tight, access is controlled, and other cameras already exist.

In late 2023, further evidence of expansion of the network was seen on Korean Central Television. The station often airs footage of a propaganda poster situated alongside a major road in front of the Pyongyang Indoor Stadium. (A TV capture from 2021 of the same location is in this report as **Figure 27)**.

In the latest image, an additional CCTV camera is visible on the camera support pole above the road. The new camera appears to be one that can be rotated to view in any direction, although in the image, it is facing forward to capture the rear of vehicles passing by. The previous camera is still visible on the pole.

Figure 30.
A structure above the Pyongyang-Hyangsan Motorway, seen in a Google Earth satellite image from April 2023. (Annotation by 38 North)

Figure 31.
Two structures above the inbound and outbound carriageways of the Pyongyang-Nampho Road, seen on a Google Earth satellite image from May 2022. (Annotation by 38 North)

Figure 32.
Structures on the Pyongyang-Nampho Road, seen in a Google Earth satellite image from April 2023. (Annotation by 38 North)

As previously mentioned, the expansion of the traffic surveillance network follows domestic research into license plate recognition technology, which has been going on since at least 2019.

In December of that year, the Pyongyang Times published a report on the expanding use of artificial intelligence at Kim Il Sung University and a showcase at the annual National Exhibition of IT Successes.

Figure 33.
A camera pole near Pyongyang Indoor Stadium with two cameras mounted on it, seen on Korean Central Television on October 10, 2023. (Image: KCTV)

The report said the Information Science Faculty of Kim Il Sung University displayed how it was using AI and deep learning "in such sectors as machine translation, voice, letter, face and fingerprint recognition, and car license number identification."

The following year, a paper in the Kim Il Sung University Journal of Information Science looked at the use of artificial intelligence technology to detect and read license plates. The report said the method developed could read a license plate in approximately 70 milliseconds with a 96.1 percent accuracy. A previous approach had a slightly higher accuracy of 96.8 percent but took around 300 milliseconds.

Then, in 2021, the Information Science Faculty of Kim Il Sung University was again recognized for its work on license plate recognition at the National Exhibition of IT Successes.

While the evidence of street surveillance and road cameras in North Korea is clear, many surveyees reported only hearing of or seeing such surveillance in rumors or foreign films.

> *In Chinese or Korean movies, I saw cameras installed and monitored in certain rooms, and I heard that CCTV is installed all over the roads.*[38]

> *I heard that there are surveillance cameras on roads and apartment corridors in foreign countries.*[39]

> *I know that there are a lot of surveillance cameras in China, Russia, South Korea, and other countries around the world, and that they are located on roads, institutions, workplaces, and apartments.*[40]

[38] In-country surveyee, North Hamgyong no. 6.
[39] In-country surveyee, Pyongyang no. 14.
[40] In-country surveyee, South Hamgyong no. 4.

Chapter 6: The Border Surveillance Network

AT A GLANCE: North Korea appears to be expanding a network of surveillance cameras along its northern border with China. Camera enclosures are visible and mounted to guard posts, although it is unclear if they contain cameras and, if so, how they function. The enclosures suggest they hide remotely operated cameras.

Such cameras could be technically capable of automatically detecting human movement in the border area. While monitoring illegal border crossings could be one job for the camera systems, they are also likely in place to watch border guards and deter them from accepting bribes and allowing passage across the Yalu River.

The cameras are being installed as part of a general increase in the northern border zone that includes additional fencing and guard posts.

The installation of security cameras along North Korea's border with China has been reportedly going on for almost two decades. While early cameras appeared to be part of an effort to prevent smuggling across the border, in more recent times, the focus has expanded, likely to include surveillance of the military and border guards themselves.

> *Just looking at the border, China has surveillance cameras.*[41]

In 2008, Daily NK reported that North Korea had imported cameras from China to install in an approximately seven-kilometer-long stretch of the Yalu River near Hyesan city. In 2012, the same publication stated the number of cameras along the border had increased greatly and that they were networked beyond guard posts to barracks locations so that they could be monitored remotely.

The remote monitoring is likely intended to keep border guards in order. Many goods are smuggled across the Chinese border, usually after bribes are paid to guards. The cameras serve to surveil the border and those charged with guarding it.

By 2019, a report said the camera network was extended to the entirety of North Korea's northern border. A year later, North Korea reportedly spent a further 20 million yuan (US $2.8 million) on security cameras from China for installation in smuggling hotspots. This was all before the massive strengthening of the border that occurred during the COVID-19 pandemic.

Cameras are often visible in images of North Korea shot across the Yalu River from China and uploaded to Chinese social media networks. In one image uploaded in 2021, what appears to be a security is mounted on a pole at a border security post in the Hyesan area.

Another image, shot from a Yalu River cruise near Dandong, China, shows a similar CCTV camera mounted at a North Korean guard post. The use of domed enclosures means it might be difficult for guards and civilians to determine the direction the camera is facing.

[41] In-country surveyee, North Hamgyong no. 8.

Figure 34.
A camera on a guard post in Hyesan, captured in a video shot from China and uploaded to social media.
(Source: Douyin)

Figure 35.
A CCTV camera on a mast at a North Korean border guard post on the Yalu River.
(Source: Ixigua)

Figure 36.
A camera on a rural border guard post, taken from a boat on the Yalu River near Hekou, China. (Source: Douyin)

Chapter 7: Facial Recognition for Security and Identification

AT A GLANCE: Facial recognition systems, which can quickly and accurately identify people from video images, have been in use in North Korea for several years.

Visitors arriving at the country's main international airport since 2019 have likely been recorded using systems, and several domestic electronics suppliers and developers have also advertised systems. Some are aimed at building access, but others appear to be for broader security purposes.

With the state's existing collection of photographs of all citizens for national ID cards, the deployment of such systems is worrying.

It is unclear if the ID card photo database is online and tied into the facial recognition systems, but even if it is not, the state has the pieces in place for a widescale digital surveillance network that offers little escape from the eye of the system.

While research into facial recognition systems began around 2014 (**Chapter 2**), systems using the technology began appearing in state media reports in 2019.

At the 2019 Exhibition of IT Successes in Pyongyang, both Phurunhanul Electronics and Kim Il Sung University demonstrated systems that used facial recognition.

Figure 37.
A poster advertising a video surveillance system (left) at the 2019 Exhibition of IT Successes. (Source: DPRK Today)

A poster advertising a video surveillance system from Phurunhanul Electronics explained that encrypted video data is sent from cameras to a server, which makes the video available to authorized computers. Interestingly, the poster said encryption prevents thieves from stealing video data from cameras installed in key areas.

It is listed as being used by the City People's Security Agency (시보안국), which is likely in Pyongyang.

At the same exhibition, Kim Il Sung University demonstrated a building access control system based on facial recognition. The centerpiece of the system was a terminal a little larger than a smartphone that ran facial recognition software called Dambo (담보, or "Guarantee"). The application represented the country's "highest level of facial recognition technology," according to state media report.[42]

Figure 38.
A terminal running the Dambo software developed by Kim Il Sung University.
(Source: Arirang Meari)

In a video report from the exhibition, a staff member of the IT Research Center demonstrated how it worked. The terminal was fixed to the right side of an access gate, and as he approached, it came to life, captured an image of his face, and then opened the gates.

[42] "새로 개발된 얼굴인식기《담보》, 국내 최고수준의 얼굴인식기술 도입," *Arirang Meari*, November 7, 2019.

Figure 39.
An access control system developed by Kim Il Sung University, on show at the 2019 Exhibition of IT Successes.
(Source: DPRK Today)

Figure 40.
A Kim Il Sung University staffer demonstrates an access control system at the 2019 Exhibition of IT Successes.
(Source: DPRK Today)

A report about the system echoed the 2014 report on the State Academy of Science's work and suggested that facial recognition technology could take over from fingerprint and access cards as a way to control access to buildings.[43]

[43] "새로 개발된 인공지능제품인 얼굴인식출입관리체계《눈빛》, 도입단위들에서 호평," *Arirang Meari*, November 13, 2019.

The facial recognition access management system is an artificial intelligence product that makes it possible to automate the access management of institutions, enterprises and departments by using face recognition technology instead of cards and fingerprints.

The same terminal was seen again in a state television report in 2021 on IT work at Kim Il Sung University. The report showed the terminal in use at the university and researchers looking at a screen that appeared to be running facial recognition software. In an image, two faces of people who appeared to be walking by a camera were outlined and seemed to have been matched to faces in the database.

This images points directly to facial recognition use in video surveillance rather than limited to identification for building access.

Figure 41.
A facial recognition terminal in use at Kim Il Sung University, seen on Korean Central Television on December 12, 2021.

Figure 42.
Facial recognition software in use at Kim Il Sung University, seen on Korean Central Television on December 12, 2021.

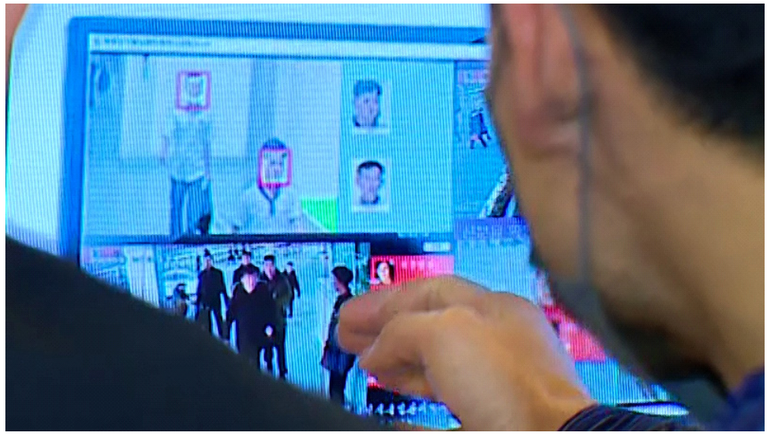

Figure 43.
A close-up on the screen of the facial recognition software, seen on Korean Central Television on December 12, 2021.

Also, at the 2019 Exhibition of IT Successes, a poster advertised a video surveillance system that uses "AI, to detect, verify in an integrated manner targets of surveillance nationwide such as classifying human faces, monitoring traffic and mountain fires."

The developer of the system was not listed, but the logo on the camera pictured appears to be that of Phurunhanul Electronics.

The technical characteristics of the system were listed as:

1. All-around intelligent surveillance support, such as recognition of faces and license plates, and detection of intruders using a deep learning network
2. Big data analysis and utilization of processing technology
3. Realization of distribution system
4. Realization of management and control of partial systems as an all-round intelligent surveillance system.

Figure 44.
A video surveillance system, advertised at the 2019 Exhibition of IT Successes. (Source: DPRK Today)

Figure 45.
A video surveillance system at the 2019 Exhibition of IT Successes. (Source: DPRK Today)

Facial Recognition at Sunan Airport

In addition to the systems unveiled at the exhibition, a working system also appears to have gone into use in 2019 at Pyongyang's Sunan Airport, which is North Korea's main international gateway.

The airport has been significantly upgraded in the last decade, and in 2019, an article in an externally facing state media outlet acknowledged the use of facial recognition at the airport and said there were plans to expand service into other sectors.[44]

> *The surveillance cameras at the entrance to the airfield are operated by high-powered computers with special programs that can quickly and accurately recognize people's faces.*
>
> *The automatic facial recognition system, developed by researchers at the Institute of Advanced Science and Technology at Kim Il Sung University, takes less than a second to identify a person's gender and age and capture facial features.*

The article also said, "The new automatic facial recognition system is now being implemented in state institutions, hospitals, shops, and other public places in the republic."

In late 2019, state media reported that the domestic Naenara (내나라) website had debuted an "integrated search system and video surveillance system."

The service used artificial intelligence "to comprehensively detect and confirm surveillance targets on a national scale, such as human identification, traffic monitoring, and forest fire surveillance."

The article went on to mention that the search engine was popular among users but offered no further details on the service, availability or access requirements and did not publish a photo of the home page.

As such, it is difficult to evaluate whether the site really allows anyone to search for anyone else across the country, as the description appears to suggest, or whether it is something slightly less impressive, as common sense would suggest.

However, it offers confirmation that at least some of North Korea's CCTV cameras are networked and available beyond the organization in which they are installed. However, identification of individuals through a nationally available website would be extraordinary, if true.

The Naenara video search service was developed by the Central Information Quality Research Institute (중앙정보화품질연구소), which is part of the National Information Technology Administration (국가정보화국).

[44] "평양국제비행장에 첨단기술이 응용된 자동얼굴인식체계 도입," *Arirang Meari*, January 25, 2019.

Amnokgang Technology Development Company

In 2020, Pyongyang-based Amnokgang Technology Development Company advertised a device that works as an access manager for buildings and secure areas and can check a person's identity using face, ID card and password, according to a state media report.

The device, called the DT-20, appears to be sourced from China. Shenzhen-based Wit Easy Electronic Co. Ltd. (深圳市睿易通电子有限公司) offers the device on the Chinese Alibaba online mall, and a listing on the company's website confirms it makes the DT-20.

According to the specifications, the terminal is based on an ARM Cortex A7 Quad Core processor and features two cameras: a high-resolution infrared camera, and a color optical camera. It has a 4.3-inch touchscreen and runs the Linux operating system. The false rejection rate is given as less than 0.1 percent, and the false acceptance rate as less than 0.01 percent.

Figure 46.
The DT-20 biometric access control handheld from Amnokgang Technology Development Company. (Source: Arirang Meari)

Chapter 8: Tracking Citizens via Electronic Payments

AT A GLANCE: While North Korea remains a largely cash-based society, the state has been working to popularize electronic payments for several years. An early generation of debit cards failed to gain widespread use, but several new smartphone-based payment systems have reportedly been more successful.

By attracting more citizens to use electronic payment networks, the state gains additional data that can be useful in determining the movements of people and goods they purchase and help map out human networks should electronic payments be made between users.

The state's recent shutdown of the popular mobile money system, which existed outside the banking sector, indicated a desire to exercise greater control over payment networks.

The launch and expansion of electronic payment systems in North Korea offer another vector by which the government can potentially track people or tie specific people to specific locations at specific times.

For example, when a card is tapped at a subway gate, a chip is read at a payment terminal or a QR code (quick-response code) is scanned in a store, it serves as a fairly reliable indicator that the account holder was present at the time of the transaction. It can also be used to work back and discover what the person purchased.

From the state's point of view, that is a huge surveillance advantage over cash transactions, although it should be noted that surveillance was not likely the primary reason for the introduction of such systems.

In North Korea, several electronic money systems have been introduced and appear to be in active use in Pyongyang. Outside of the capital city, their availability is less well understood, but it seems that fewer shops accept them, and fewer people use them.

North Koreans got their first taste of electronic money in the early 2010s by repurposing the credit system used to top up Koryolink mobile phone accounts.

Subscribers to the Koryolink network paid 3,000 North Korean won (KPW) a month for 200 call minutes and a further 150 won in mobile money. When the call minutes run out, the money could be used to buy additional minutes. At the end of each month, the unused call minutes were lost, but the mobile money was not. That means users who consistently made less than 200 minutes of calls per month could build up a balance in mobile money.

The mobile money could be transferred to other account holders, so it became an early method of cashless payment, particularly in unofficial markets.

When making small payments for goods and services, some traders would accept a transfer of mobile money credits in lieu of cash.

The system became very popular and allowed financial transactions to take place outside of the conventional financial system, so it is no surprise that it was eventually shut down. In October 2020, reports emerged from the country that mobile money payments had been heavily restricted by the government in July of that year. The result of the state's move was a collapse in the phone money payment system.

Chip-based payment cards were introduced by banks in around 2010, although cashless payment did not appear to have become popular until the roll-out of QR-code phone payment systems about a decade later.

Initial uptake was poor because of a severe lack of trust in the banking sector. A January 2021 story by Daily NK reported that banks are the least trusted organizations in North Korea, and citizens are wary about keeping their savings in banks.

Much of this distrust stems from the 2009 monetary reforms that redenominated its currency overnight and wiped out the savings of many people. The move also collapsed markets, caused significant opposition among the North Korean public and ultimately forced the state to backtrack on some of its edicts.

So many people preferred to keep their savings in cash.

However, like people all over the world, North Koreans appear to be choosing convenience over privacy. A subsequent August 2023 report by Daily NK said more and more North Koreans are using e-money after seeing its convenience.

The report quoted a North Korean source estimating around six in 10 people in Pyongyang and four in 10 people outside of the capital were using smartphones to make purchases. The reason given was that it relieved people of having to travel to pick up shopping.

Additionally, the source said eight in 10 people in Pyongyang and two in 10 in the provinces used a QR-code-based payment system to buy goods in stores and markets.

Phone payments are seen as easier because people do not have to walk around with a lot of cash, it relieves the worry of being pickpocketed, and it is easy to pay the exact amount rather than expect change that sometimes the vendor does not have.

North Korea has several payment systems, including at least two that make use of QR codes.

North Korea's Electronic Payment Systems

Narae

The Narae (나래) pre-paid debit card has been available since 2010 and is understood to be the first widely accepted payment card in the country.[45] It was originally issued by the Foreign Trade Bank.

This helps explain why, unusually, it was available to foreign visitors to the country in addition to citizens and was advertised in hotels where foreign visitors stayed.

[45] "Электронная карта оплаты услуг 'Нарэ' ("Electronic payment card services 'Narae'")," *Show and Tell Pyongyang*, January 20, 2011.

The card is topped up with foreign currency that is transferred into North Korean won based on the official exchange rate of the day. The card balance can also, in theory, be refunded based on the rate of the day of refund.

In 2012, a promotional leaflet said it could be used at hotels, department stores, car repair shops and taxis around Pyongyang.

> *Check cards are being introduced. So, for example, when you're paying for your mobile phone, you are asked to use your check card instead. You can send money or wire money to somebody's bank account.*[46]

Figure 47.
A Narae payment card, issued by the Foreign Trade Bank of Korea in December 2010. (Source: Pyongyang Show and Tell)

Jonsong

The Jonsong (전성) electronic payment system was developed by the Central Bank and the Pyongyang Information Technology Bureau and first introduced in 2015.

Originally, it was available as a payment card, but by 2017, it had evolved into a smartcard-based system. It further developed into a smartphone payment app a few years later.

A profile of the system in 2017, as the smartcard variant was being rolled out, reported it could be obtained at city and county branches of the Central Bank. Other banks, including the Foreign Trade Bank and Taesung Bank, also accepted the card.

It could be used in a variety of places, including post offices in each province and the Kwangbok District Commercial Center, Mirim Horseback Riding Club, Masikryong Ski Resort, Munsu Water Park, Okryu Restaurant and Chongryu Restaurant.

[46] Escapee interview no. 7.

Figure 48.
A graphic used in North Korean media, illustrating the shift to a smartcard system. (Source: Sogwang, January 18, 2017)

Figure 49.
A poster on the wall of a shop in Pyongyang advertises the Jonsong Card, seen on Korean Central Television on May 30, 2021.

The smartphone system was introduced during the COVID-19 pandemic, and the Arirang Meari (메아리) website reported it "plays an important role in stabilizing the money supply, but also plays a large role in preventing the spread of viruses and bacteria caused by the use of banknotes."

A subsequent image broadcast on state television in May 2021 showed a poster promoting the Jonsong system. Above it, a small QR code was on display next to the Jonsong logo, indicating the system is based on QR codes.

Manmulsang

The Manmulsang (만물상) payment system is an offshoot of an e-commerce site on North Korea's domestic intranet of the same name. The system and website are both operated by Yonphung Commercial IT Company, which imports and sells products.

The Manmulsang payment system is a QR code-based system and has been in operation since at least 2020 when it was shown on state television in a shop.

Figure 50.
An electronic payment with the Malmulsang App, seen on Korean Central Television on November 15, 2020.

The payment system can currently be used to pay for goods in physical and online stores, to transfer money between users, to buy tickets for events and to pay for mobile phone bills, according to a brochure for the service published by NK News in 2022.

The brochure claims that users will enjoy privacy thanks to the encryption of payment information and user details, but notes that privacy comes from a reliance on the National Electronic Certification System (국가전자인증체계). That implies a state-issued encryption certificate, which in turn means that while transactions may be protected from hackers, the state can decrypt any payment.

Ullim Payments

The Ullim payment system is an electronic payment system developed by the Card Research Center of the Pyongyang Information Technology Bureau.

It appears to allow Jonsong Card holders to make electronic payments online or send money to other users. A manual obtained by Daily NK indicates it costs users 3,000 KPW to register to use the system, and there is a three percent commission on payments.

The system can be used on smartphones and, from version 2.0, on computers running Windows or the domestic Red Star 4.0 operating systems.

Chapter 9: Surveillance on Telecommunications Networks

AT A GLANCE: Surveillance is a long-standing presence on North Korea's telecommunications networks. Much of it still appears to be done manually, with security agents listening to calls, and its existence—and safety methods employed to avoid it—are well known.

The majority of North Korean life is still conducted in the real world—not online—but new services such as the Mang TV Internet streaming service provide a new vector though which North Koreans can be monitored by the state. For example, log files kept by streaming servers record when and what was watched by a subscribing household, helping to prove someone was present in the house. Perhaps more worryingly, such services can also be used to monitor what people do not watch—a concern in a country where citizens are expected to consume state propaganda.

North Korea conducts routine surveillance of communications across its telecommunications networks, and citizens are aware of the possibility that calls might be monitored. Among interviewees, there is a belief that monitoring does not take place unless the state dictates suspicious activity. They believe that calls are not randomly or routinely monitored unless they, for example, exceed a certain length of time.

> *After talking for about five minutes, [citizens] know that they are going to be wiretapped. So, they talk for about five minutes, hang up, and then they connect again a little later. Every three or five minutes, they hang up their phone calls.*[47]

> *You'll get tracked if you talk on foreign-made cellphones or make international calls or other types of calls on the border for more than five minutes and 30 seconds.*[48]

North Korea operates a two-tier fixed and mobile telephone network. The majority of citizens have access to the domestic tier that allows for calls to and from domestic lines and, on smartphones, access to the state intranet. Callers on this tier can receive calls from other domestic lines. The second tier allows users to make and receive international calls and access the Internet. This is mainly used by resident foreigners, visitors, and some senior North Korean party members.

To prevent information from spreading from those with international access to the rest of the population, calls cannot be made between the two networks. Therefore, some organizations, such as foreign embassies in Pyongyang, have two telephone numbers: one on the domestic network and one on the international network.

Mobile Networks

North Korea has two mobile phone networks, both of which are under state control. Surveillance of users is understood to be common.

[47] Escapee interview no. 10.
[48] In-country surveyee, Gangwon no. 2.

The ability to monitor phone calls and data sessions is built into most mobile networks worldwide and is usually accomplished via a "legal interception gateway," or LIG. The LIG was discussed at a 2008 meeting in Malaysia, held between representatives of the Korea Posts and Telecommunications Co. (KPTC) and Egypt's Orascom Telecom when the latter was building the country's first 3G network.

Initial specifications called for support of up to 2,500 targets and the ability to monitor 300 phone calls and 300 data sessions concurrently. The monitoring system could intercept voice calls, text messages and fax messages while the data monitoring system supported hypertext transfer protocol (HTTP, websites), file transfer protocol (FTP, to upload and download of files), multimedia messaging service (MMS) messaging and simple mail transfer (SMTP), post office (POP3) and internet message access (IMAP4) email protocols.

The meeting was held prior to the launch of the network, but plans were already in place for an expansion to 5,000 target subscribers and an additional 300 concurrent phone and data sessions.

Voices From North Korea: Cellphones and Wiretapping

> *If you are in the smuggling business. A lot of people know that your phone is going to be wiretapped. It's kind of general knowledge.*[49]

> *Residents know that they are wiretapped. They say amongst themselves, "I know that state is eavesdropping. They're listening to what I'm doing. They're watching what I'm doing via phone."*[50]

> *I saw in a foreign movie that tracking and wiretapping programs are used against people. Does that mean all aspects of their lives are exposed?*[51]

> *Citizens are always concerned and always careful when using their phones. Especially vendors and businesspeople when they do transactions with China.*[52]

Wi-Fi

The Mirae Wi-Fi network began in Pyongyang in 2018 and solves two problems for the state: it provides a 70 megabits per second (Mbps) signal, which is much faster than the country's two 3G cellular networks, and it can help connect tablets and laptop computers in homes and outdoors.

At launch, the service was only available in a small area of Pyongyang, but it appears to have spread in subsequent years. In 2022, a report said it works well in Pyongyang, Pyongsong and Nampho but less well in other areas where there are fewer base stations.

[49] Escapee interview no. 6.
[50] Escapee interview no. 9.
[51] In-country surveyee, South Hamgyong no. 5.
[52] Escapee interview no. 10.

A 2023 report said about one in five citizens in the country used the service, although the report noted that the number may be lower due to some subscribers having both a mobile phone account and home modem.

Access to the network requires the Mirae app and a subscriber identity/identification module (SIM) card. The app also checks to make sure the phone is on a list of approved devices and asks for a username and password. This means three levels of verification to access the domestic intranet via Mirae. The result is that any activity on the network can be easily traced back to a particular user and terminal.

Internet

Access to the Internet is highly restricted in North Korea. While most citizens cannot access the network, some, such as students, scientists and engineers, are allowed limited and monitored access.

> *In 2012, some North Koreans walked by the German Embassy and accidentally connected to Wi-Fi. They were so surprised, word spread, and a lot of people went to that area to connect to the Internet. In response, the government asked all embassies to put a password on their Wi-Fi and lower the signal. They also deleted the Wi-Fi function in North Korean phones afterward.*[53]

According to a report published in 2023, the potential user must submit a request for access to the Internet, setting out their need to do so and the specific research and websites to be accessed. The request has to be approved by the chief of the organizational unit, the party secretary, and the State Security Department.

If approved, access is permitted but only in the presence of a librarian monitoring the usage. The report quoted one user as saying, "every five minutes, the screen freezes automatically, and the librarian must do a fingerprint authentication to allow further Internet use." Further, South Korean websites were censored, and users could only download English and Chinese content.

Streaming Services

The launch of IP streaming services in 2016 provided the North Korean state with another possible way to monitor and track citizens.

Anyone who uses a streaming service knows that users are constantly tracked, so the system can provide better recommendations or offer the chance to pick up a TV show where you left off. In North Korea, this tracking could be used for more sinister means.

It is important to note that there is no evidence such services are being used to track people, but as tracking is such a basic part of these services, there is a likelihood that it is either being used or will be in the future.

[53] Escapee interview no. 36.

An IPTV service can tie a user to particular locations as the client device in the home needs to poll a video server each time the user selects a video, changes channels or performs some other tasks on the system.

In the case of a service like Manbang, user logs could conceivably be used to determine if someone were present in a house at a certain time. A more sophisticated use case might be to watch for anomalies. For example, if a resident is home every night at 9 p.m. and one night is suddenly absent, the system could potentially flag this.

It can also monitor what content someone watches and what they do not watch. The latter could be particularly troublesome for citizens in a country like North Korea, where they are expected to watch and learn the leader's speeches and understand party instructions.

Mang TV

North Korea's Manbang IT Supply Center (만방정보기술보급소) introduced a streaming TV service called Mang TV (망 TV) in mid-2016. The service, offered via the state intranet, provides viewers access to four TV channels and a library of video-on-demand options from state TV shows, domestic movies, children's programming and articles from the Rodong Sinmun party daily newspaper.[54]

In Pyongyang, most homes already have access to all four TV channels, but outside of the capital, only Korean Central Television was widely available, so the Mang TV service offered a considerable increase in entertainment choice, albeit only state-sanctioned content.

The service is delivered as an IP stream over the national data network to a set-top box.

Mang TV requires a connection to the national intranet and a monthly charge, according to the report. It is unclear how many homes are connected.

Figure 51.
A Mang TV set-top box. (Source: Martyn Williams)

[54] "Manbang Network TV Receiver," Korean Central Television, August 16, 2016.

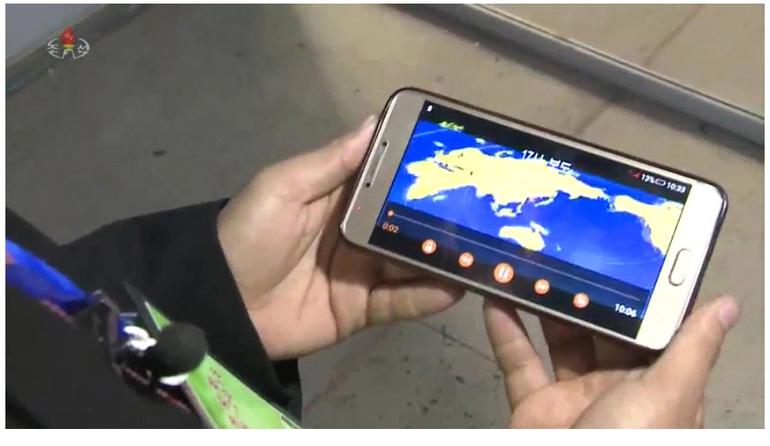

Figure 52.
The Mang TV app running on a smartphone at the 2018 Exhibition on IT Successes.
(Source: Korean Central Television, November 8, 2018)

At the 2018 Exhibition of IT Successes, the company demonstrated a version of the service available via tablets and smartphones.

Nuri

A couple of years after the launch of Manbang, state media reported on a system called Nuri (누리). The Nuri service was developed by Kim Il Sung University's Communications Industrial Institute and was reported in the Rodong Sinmun on July 30, 2018.

It was accompanied by a photo of the researchers accessing the service.

Unlike Manbang, the Nuri service appears to be more of an IPTV platform than a service. Organizations that want to deliver video library services to users can use Nuri to build such a service, the newspaper reported.

Figure 53.
Researchers at Kim Il Sung University demonstrating the Nuri IPTV service.
(Photo: Rodong Sinmun)

Chapter 10: Factors Holding Back Greater Deployment of Digital Surveillance

While the use of digital surveillance technology continues to spread in North Korea, our research did not find evidence of a widescale nationwide integrated digital surveillance system similar to that used in China.

While we believe it is inevitable that the state will harness increasingly greater amounts of digital data to surveil its people, there are several technical factors that will continue to prevent full deployment.

One is financial. Much of the hardware used in surveillance systems in North Korea comes from China, so hard currency is required to purchase the gear. A national surveillance network will require a considerable investment.

As discussed earlier in this report, the lack of reliable electricity supply throughout most of the country appears to be one reason why surveillance cameras have not been more widely deployed. While supply is less of a problem in Pyongyang and industrial areas, many parts of North Korea get only a few hours of power or less each day.

Solar power, which is already in widespread use across the county, could be used to power modern cameras, but we have not been able to find evidence of deployment of solar-powered cameras, so there are likely other reasons at play, such as the telecommunications network.

Any national-scale surveillance network needs a strong telecommunications backbone, and while there is a national intranet, it does not reach deep into the country. In many areas, data connectivity is via cellular and North Korea's 3G mobile networks likely do not have the capacity to support a large surveillance network.

However, in late 2023, the country began installing a 4G cellular network. While the speed of the new network is unknown, it is likely many times faster than 3G and will help solve any data communications bottleneck.

Another technical issue is the computing power needed to run large-scale surveillance systems. It appears that many of North Korea's systems are run on computers local to the cameras rather than on servers in data centers.

Finally, the county's continuing reliance on human surveillance networks, such as its large internal security services and the local *inminban* system. These systems have served the regime well for decades, and while not holding back deployment of digital systems, they do somewhat reduce the urgency of adoption.

Chapter 11: Citizens' Limited Awareness About the Realities of Digital Surveillance

As digital technologies are introduced in-country—whether through domestic production, above-the-board international trade or more illicit means—North Koreans are faced with new surveillance technologies.

Our research highlighted a discrepancy between what citizens currently living in North Korea know about digital surveillance technology, how it is used and what it is actually capable of, both in and out of the DPRK.

> *North Korea is an environment where you are under surveillance from the moment you are born to the moment you die.*[55]

Misinformation Regarding Digital Surveillance

As discussed in this report, many North Korean citizens know the dangers of interacting with illicit content but are not always mindful of how everyday technologies work—both for them and against them.

While many North Koreans know how long a phone call can last before you are wiretapped, few were aware or had a misunderstanding about the capabilities and dangers of digital technologies, such as security cameras, drones, satellites and the collection of biometric data.

> *In foreign countries, I heard that people don't carry their ID cards in their pockets because they put digital chips inside their arms.*[56]

> *I heard that the US and China are looking down on our land through satellites and know where we are and what we are doing.*[57]

> *I heard that in China and developed countries, there are cameras on every street, alley, building and school, so if something happens, you will know everything in a few days.*[58]

> *Through a lecture, I heard that military technology has now reached a level where drones fly in the sky to monitor everything.*[59]

And while some expressed a lack of understanding the specifics of the digital technologies they used, most knew the surveillance was effective.

> *I don't know [about] surveillance technology, but I know it's working.*[60]

[55] In-country surveyee, South Hamgyong no 8.
[56] In-country surveyee, Pyongyang no. 5.
[57] In-country surveyee, Pyongyang no. 8.
[58] In-country surveyee, Pyongyang no. 9.
[59] In-country surveyee, Pyongyang no. 2.
[60] In-country surveyee, South Pyongan no. 3.

Thirst for Knowledge and Know-how

It will not be long before digital and surveillance technologies become more widespread and commonplace, reaching even the remotest corners of the country. Even with a lack of consistent power supply and materials for domestic manufacturing and production, the reality of digital surveillance for North Koreans will soon come to a head.

However, there is hope. Alongside citizens' ingenuity is the ever-present desire for knowledge, including about the technologies that can both help and hamper their daily lives.

> *I want to know more about whether TVs, recorders and LCD TVs [really] don't leave a viewing record.*[61]

> *I want to know how to avoid wiretapping.*[62]

The North Koreans we surveyed expressed a wish to learn about global affairs and foreign content despite the growing use of surveillance technology.

> *I want to watch something a little new, like maybe some international affairs.*[63]

> *I want to hear the truth about ever-changing world affairs.*[64]

Many also expressed their wishes for those outside the country to know and understand more about the realities of everyday North Koreans.

> *The reality that we have no freedom? Human rights violations? I want to tell them everything.*[65]

> *I want to show them exactly how we live here.*[66]

Helping the North Korean People

Our research has highlighted a great need for information dissemination into the country to help raise awareness of the potential risks associated with surveillance technologies. There is also a need for greater digital literacy and guidance on how to safely utilize digital technology, alongside citizens' consumption of illicit foreign content and harsher punishments. With targeted education and access to resources, North Korean citizens may begin to make more informed decisions that can shape their future.

[61] In-country surveyee, South Hamgyong no. 10.
[62] In-country surveyee, South Hamgyong no. 4.
[63] In-country surveyee, Pyongan no. 1.
[64] In-country surveyee, South Hamgyong no. 1.
[65] In-country surveyee, North Pyongan no. 11.
[66] In-country surveyee, North Pyongan no. 8.

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Graphic design by **Maria Francisco**. Korean translation by **Kyong Jin Seo**.

Appendix: Major Development Organizations

State Academy of Sciences (국가과학원)

The State Academy of Sciences is the national science academy of North Korea and is engaged in basic-level scientific research and development. It was founded in 1952 and is the largest and most prestigious research organization in the country.

It is based on a large campus in Pyongsong, about 50 kilometers north of Pyongyang. Adjacent to the campus is the University of Sciences, which also works on biometric technology research and development, and the Wisong Scientists Residential District, which houses apartment buildings, schools and other services for scientists.[67]

The academy has numerous institutes and affiliated organizations, including the institutes of physics, mathematics, electronics, mechanical engineering, thermal engineering, microbiology, mining, metallurgy, chemistry, light industry, rail transport, fishery and forestry. Affiliates include the Hamhung Branch Academy and branch academies of railway science, coal science, biotechnology, light industry, fishery science and architectural engineering.[68]

Much of the work on biometric identification systems being undertaken by the Mathematics Institute (수학연구소), which occupies a 10-story building at the heart of the site.

Figure 54.
The Mathematics Institute building (right) on the campus of the State Academy of Science, shown on Korean Central Television on May 1, 2022. (Source: Korean Central Television)

The biometrics work appears to be centered on the mathematics institute because of the algorithms required for such work. In addition to fingerprint recognition, the center has also worked on Korean voice recognition and related signal processing, according to a 2017 profile.

[67] 38 North Digital Atlas.
[68] "State Academy of Sciences," *Naenara*, May 2, 2018.

As early as 2011, the institute was credited with developing the software for a pen-input computing device. The unit allowed a user to write on a touch screen with a stylus, and handwriting recognition software would convert the input to text.

Kim Jong Un has visited the academy at least twice, once in 2014 and once in 2018. The current president is Kim Sung Jin, who is also a deputy to the Supreme People's Assembly.

Kim Il Sung University (김일성종합대학)

Kim Il Sung University is the country's premier seat of higher education and is located on a large campus in Pyongyang's Taesong District.[69]

It was founded in 1946 and has around 16,000 students spread across seven departments in the social science field and 12 departments in the natural science field. It also runs a department of education and online distance education service.

Biometrics research takes place at the University's High Tech Development Institute, which occupies a nine-story, 15,000 meters squared (m^2) building that was opened in 2018. The building is the newest major structure on the campus and houses several centers that are all involved in high-tech research.

They include the Scientific Experiment Equipment Center, Nanotechnology Research Center, Biological Industry Research Center, Electronic Materials Center, Information Technology Center, Analysis Center, Telecommunication Research Center, and Electronic Product Manufacturing Works.

Figure 55.
The Kim Il Sung University Institute of Information Technology, shown on Korean Central Television on January 24, 2022. (Source: Korean Central Television)

The Information Technology Center heads the biometrics work.

A profile of the center, provided by the university, says it "concentrates on artificial intelligence, internet of things, big data analysis and other core areas." It has seven laboratories, according to the profile.[70]

[69] 38 North Digital Atlas.
[70] Kim Il Sung University homepage, http://www.ryongnamsan.edu.kp/univ/, accessed February 2, 2023.

The application of artificial intelligence is relatively new in North Korea, and much of the work appears to be centered around Kim Il Sung University.

The university discloses some of its research through a series of scientific journals and papers that are regularly produced.

The current president is Kim Sung Chan, who is also the country's minister for higher education. He was first mentioned in the role by state media in January 2022 but reportedly held the position from July 2021. In January 2021, Ri Kuk Chol had been appointed to the role but was removed several months later, reportedly due to poor standards in the education sector. Prior to Ri, the position had been held by Choe Sang Gon since 2019.

Kim Chaek University of Technology (김책공업종합대학)

Kim Chaek University of Technology was established in 1948 as Pyongyang College of Technology from the separation of engineering and transport faculties from Kim Il Sung University. It was intended to be a technical college and remains so to this day. It transitioned from a college to a university and took its present name in 1988.[71]

The university is housed inside three main buildings in central Pyongyang: the Mirae Sci-tech Center, e-library building and a gymnasium. It is organized into 17 faculties and 11 institutes.

The main building, which was completed in 1992, houses 12 of the faculties including the important Faculty of Information Science and Technology. The building has over 90,000m^2 of floor space.[72]

Figure 56.
Kim Chaek University of Technology in Pyongyang, shown on Korean Central Television on February 1, 2021.
(Source: KCTV)

The Mirae Science and Technology Center is a companion building that houses the Mirae Science and Technology Company (aka Mirae Sci-tech Company, Miraetech Company). The company is a commercial arm of the university that takes research done at the university and turns it into products and services.

[71] Kim Chaek University website, www.kut.edu.kp, accessed February 2, 2023.
[72] Ibid.

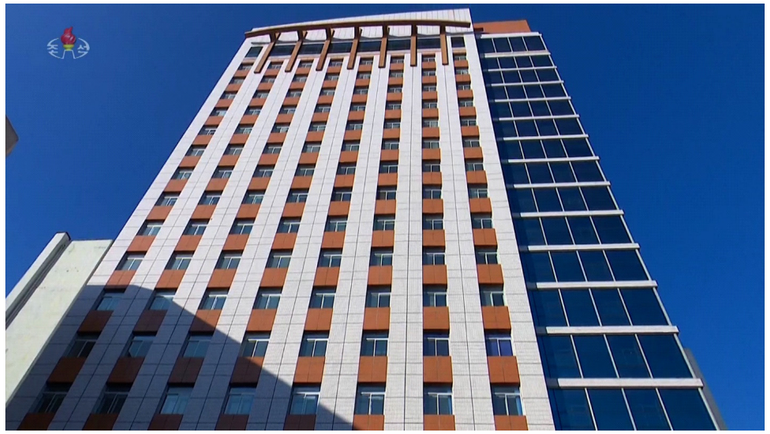

Figure 57.
The Mirae Science and Technology Center at Kim Chaek University of Technology, shown on Korean Central Television on January 9, 2022.
(Source: KCTV)

It was founded in 1996 and works in a wide range of areas, including websites, factory automation and measuring devices. Its work in the biometric field includes a fingerprint reader.[73]

A 2015 profile of the company in North Korean state media reported it maintained an office in Dandong, China, to coordinate with Chinese entities and to work on projects for customers in other countries.

[73] "Mirae Science and Technology Company," *Naenara*, July 11, 2015.

University of Sciences (리과대학)

The University of Sciences was established on January 17, 1967, as a center for training scientists. It is located in Pyongsong, to the north of Pyongyang, on a campus adjacent to the State Academy of Sciences.

A profile of the university published in 2022 says it has "more than one hundred departments" with over 5,000 students and over 800 academics spread over faculties that include mathematics, chemistry, physics, life sciences, electronic science, information science, control science and engineering. It also has a distance education faculty that produces lectures for remote learners.[74]

The university's IT Institute works on "research and development of processing technologies of speech, language information and image information," according to the profile. A photograph accompanying the description showed what appear to be a number of fingerprint recognition modules. On one of the circuit boards, the name "Fingerprint Identification Controller" is visible.

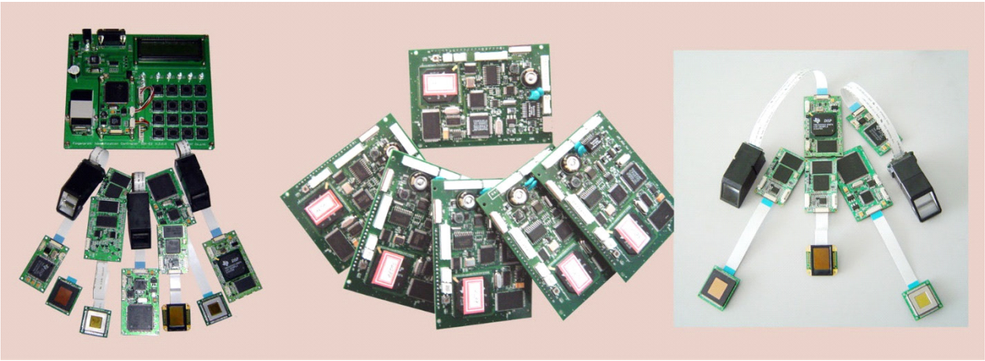

Figure 58.
Circuit boards for fingerprint recognition systems, featured in a 2022 profile of the University of Sciences.

A 2019 state media report noted that the University of Sciences is one of several institutions pioneering artificial intelligence work in North Korea.[75]

[74] University of Sciences pamphlet, *Foreign Language Publishing House*, 2022.
[75] "Nation directs efforts to developing AI technology," *Pyongyang Times*, May 25, 2019.

Korea Computer Center (조선콤퓨터쎈터)

The Korea Computer Center in Pyongyang's Mangyongdae District was founded on October 24, 1990, as the country's main center of computer programming and research. In the early 1990s, the computer revolution was in its infancy, and KCC brought together many of the country's greatest minds in computer science.

By the end of its first decade, the center claimed to have a staff of over 800 engineers and be running a college where students could study computer science.[76]

Around 2000, KCC began expanding with centers that specialized in different types of research and regional computer centers in each provincial capital. The specialist centers included the following:[77]

- Osandok Information Technology Center
- Mangyong Information Technology Center (August 2002)
- Oun Information Technology Center
- Samilpo Information Technology Center
- Chongbong Information Technology Center (August 2002)
- Sobaeksu Information Technology Center (October 1990)
- Milyong Information Technology Center
- Samjiyon Information Technology Center (October 1990)
- Naenara Information Service Center

At around the same time, biometric systems development was well underway.

In a profile on Korean Central Television that year, an engineer was shown using an early voice dictation system on a computer that reportedly understood 100,000 words and had a success rate of 80 percent.

The report also showed a fingerprint entry control system for buildings and offices that could search at a rate of 300 fingerprints per second.[78]

The following year, at least three fingerprint-based systems had been developed: AFIS2000 was targeted at use in police investigations, while KAFIS90 appeared to be more rounded and could be used for access control, work attendance and large-scale ID checks, according to an article.

The KAFIS system could scale from several tens of people to several million and was based on an SQL database, according to the article.[79]

[76] "Korean Computer Center," *Korean Central News Agency*, January 27, 1999.
[77] Korea Computer Center website, 2015.
[78] *Korean Central Television*, May 8, 2001.
[79] "DPRK Fingerprint Identification Software Displayed at Beijing Exhibition," *DPRK Infobank*, May 16, 2002.

Figure 59.
The Korea Computer Center in Pyongyang, seen in a 2010 promotional video produced by the company. (Source: Martyn Williams)

In the pre-sanctions early 2000s, KCC also looked to sell its software overseas and had offices in at least China and Malaysia. In 2005, its Baduk software was available in South Korea.

All of the international activity was conducted through the Korea Sinhung Company.

In recent years, KCC appears to have taken a much smaller role in the country's IT development. It was last mentioned in state television and media reporting in 2013 in relation to the opening of an IT fair. The reason for this drop in visibility is unclear but could be related to the rise in prominence of state-owned enterprises and the establishment by Kim Il Sung University and Kim Chaek University of Technology of organizations charged with exploiting research directly.

Pyongyang Information Technology Bureau (평양정보기술국)

The Pyongyang Information Technology Bureau was founded on July 15, 1986. As such, it is one of North Korea's original centers of IT development, being founded four years ahead of the Korea Computer Center.

Figure 60.
Pyongyang Information Technology Bureau, seen on Korean Central Television on March 19, 2023.

The bureau's work is occasionally mentioned in North Korean media. In recent years, most mentions have been surrounding awards it has received at national IT exhibitions and the work of its Card Research Institute (카드연구소에서).

The institute appears to be leading development of all types of electronic and smart payment cards in the country.

Figure 61.
Workers at the Card Research Institute of Pyongyang Information Technology Bureau examine smartcards in a segment broadcast on Korean Central Television on December 31, 2017.

It was credited with working alongside the Central Bank on the Jonsong payment card and developing the Ullim payment gateway that works with the Jonsong Card to enable online payments.

Some of its work was highlighted on state television in late 2017 and early 2018. The report showed the institute and workers sitting at PCs. Some were examining a selection of smartcards and payment cards, although it is unclear whether the cards were produced by the institute.

Figure 62.
Workers at the Card Research Institute of Pyongyang Information Technology Institute, shown on Korean Central Television on December 31, 2017.

Figure 63.
A collection of North Korean smartcards and payment cards, shown on Korean Central Television on January 21, 2018.

The broadcast showed a selection of cards, including a Koryolink SIM card for a mobile phone (almost certainly not produced in the country), a Jonsong payment card, a health card and a gasoline card.[80]

[80] SIM stands for subscriber identity module or subscriber identification module.

Amnokgang Technology Development Company (압록강기술개발회사)

Aka the Yalu River Technology Development Company, Korea Amnokgang Technology Development Company, Korea Aprokgang Technology Company, 압록강기술개발회사, 鸭绿江技术开发公司.

The Amnokgang Technology Development Company is based in Pyongyang's Pothonggang District and is one of the oldest IT enterprises in North Korea. According to state media, it was formed in 1982 and took an early lead in the development of fingerprint recognition technology in the country in the 1980s.[81]

Its president is Han Chol Ho (韩哲虎), and images of him often appear in company profiles.

Figure 64.
Amnokgang Technology Development Company President Han Chol Ho (right) pictured in a 2021 profile of the company alongside his company's biometric security devices. (Source: DPR Korea Magazine)

In the last few years, the company has reportedly expanded into other areas of biometric identification including facial, voice, iris and palm vein.[82]

Presentations of the company and its products in North Korean magazines (images above) reveal some of its current products, including a security camera and various units with fingerprint and facial recognition.

At least two of the products appear to be sourced from China.

The company has "over 50 development and marketing agencies in 20-odd countries in Asia, Europe and other parts of the world," according to North Korean media. This claim is difficult to verify, although there is some evidence of international operations.[83]

[81] "Amnokgang Technology Development Company," *Naenara*, July 19, 2022.
[82] "Amnokgang Technology Development Company," *Naenara*, March 23, 2021.
[83] Ibid.

Its fingerprint technology was deployed in Rivers State in Nigeria in or around 2006, according to a paper published in 2017 by the Center for Nonproliferation Studies (CNS).

The same paper also found an active Nigerian affiliate of the company called Katrad Aprokgyang Technology Co. in Lagos. Further, it found the Nigerian company has links with a Chinese company called PEFIS Electronic Technology, Beijing, Co. (培富士电子技术(北京)有限公司), which includes Amnokgang Technology Development Co. as a main shareholder. Other links were found to companies in Malaysia and Russia.

In research for this report, the Nigerian company was found to still be active as of May 2022.[84]

PEFIS Electronic Technology, Beijing, Co. had its business license revoked in 2018, reportedly as a result of UN Resolution 2375. It holds a trademark for "PEFIS" in China and is a shareholder in Nanjing Taixi Electronic Technology Co., Ltd., which is described as a manufacturer of fingerprint systems and fingerprint key products. Both companies share the same person, Li Wenshan (李文山), as a company officer.[85]

Figure 65.
An electronics production line pictured in a profile of Amnokgang Technology Development Company in 2021. (Source: Naenara)

[84] Nigerian Corporate Registration Number 424297.
[85] PEFIS, China Trademark Number 1346337; PEFIS Electronic Technology, Beijing, Co., 培富士电子技术(北京)有限公司, China Uniform Social Credit Code 91110105600060517H; and Nanjing Taixi Electronic Technology Co., Ltd., 南京泰熙电子科技有限公司.

Rungnado IT Trading Company (Rungrado IT Trading Company)

The Rungnado IT Trading Company, which is related to a sanctioned entity, was profiled once in state media in 2014 but otherwise appears to either keep a very low profile or is out of business.

In the profile, published on the Naenara website in 2014, the company was described as established in October 2004 and a "leading researcher and developer of software and related products."[86]

Figure 66.
The Rungnado IT Trading Company, seen in a profile on the Naenara website published in 2014. (Source: Naenara)

Of particular interest to this research is a focus on digital image processing and security software.

"Its ID-related programs are diverse in applications and high in technical efficiency," according to the profile. "In particular, programs for identifying faces, car numbers, fingerprints and bar codes and well as for traffic control and 3D games are enjoying popularity among clients in many countries."

It went on to mention an automatic fingerprint classification and retrieval system, although offered no detailed, and said the organization was taking orders from overseas customers through an Internet page, although again did not provide access details.

Our research has uncovered no other information about the company or its products, but there is a link with the Korea Rungrado Ryongak Trading Co., which has been sanctioned by the US and other countries since 2017.

Both the Rungnado IT Trading Company and the sanctioned company share the same phone number (850-2-381-8022), fax number (850-2-381-4507) and email address (rrd@star-co.net.kp) despite listing different addresses. The IT company claims to be based in Pyongyang's Central District, while the sanctioned company is in the Pothonggang District.

[86] "RITTC Vibrant with IT Development," *Naenara*, March 5, 2014.

Yonphung Commercial IT Company (연풍상업정보기술사)

The Yonphung Commercial IT Company (aka Yonphung Business IT Center) is an importer and seller of IT and related technology products.

It launched the country's first e-commerce site, called Manmulsang, in October 2015, and the site has expanded to include a wide range of products.[87]

Figure 67.
Workers at Yonphung Commercial IT Company, seen on Korean Central Television on August 26, 2021.

Figure 68.
The Manmulsang app on a smartphone, seen on Korean Central Television on August 26, 2021.

[87] "널리 일반화되여가는 전자상업봉사 (E-commerce service becoming widely available)," *Chosun Sinbo*, December 1, 2017.

The site operates as an e-commerce platform and other companies can open storefronts on Manmulsang and sell their own products, according to North Korean state media.[88] In January 2021, the site began selling foreign products.

Yonphung has also launched an e-payment system based on QR codes under the Manmulsang brand (see the electronic money section).

[88] "E-commerce gets expansive," *Korea Today*, no. 3 (2021): 32.