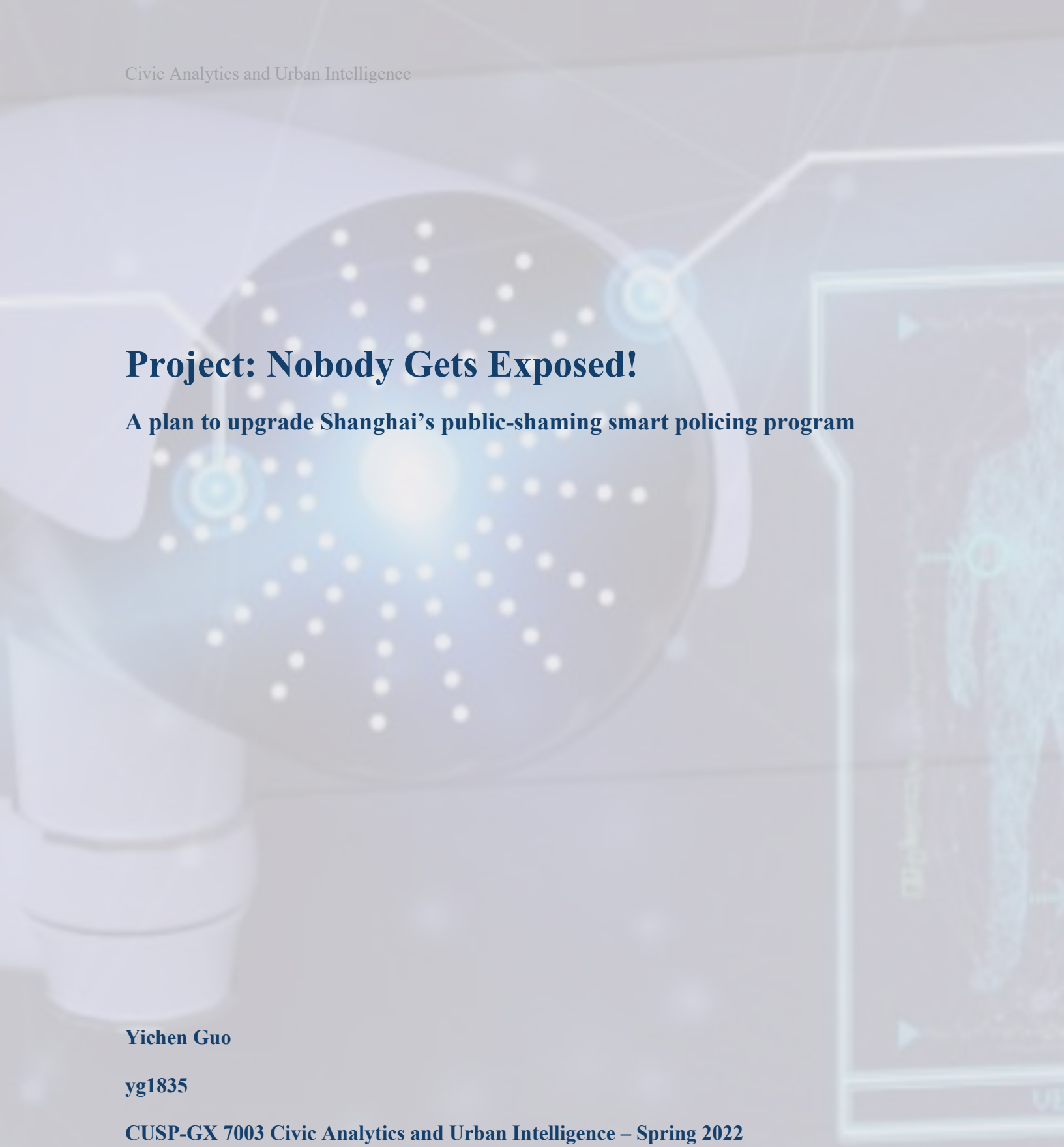

Project: Nobody Gets Exposed!

A plan to upgrade Shanghai's public-shaming smart policing program

Yichen Guo

yg1835

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Overview:

The Public Security Bureau of Shanghai (PSBS) handles policing, public security, social order, and migration matters that serve 24.87 million residents. The bureau has 27 departments, which work closely to ensure public safety and transit orders. Figure 1 shows the organizational chart of China's policing system. The whole structure follows a hierarchal order. The high-level organizations include the Chinese Central Government, State Council, Ministry of Public Security, Ministry of Finance of the People's Republic of China, and Shanghai Municipality Government. The local-level organizations related to smart policing include the Shanghai Public Security Bureau, Shanghai Municipal Bureau of Finance, and Shanghai Traffic Police Division. The Shanghai Public Security Bureau and Shanghai Traffic Police Division both have district-level sub-division across the 16 districts in Shanghai. The lower-level organizations follow orders given by organizations at higher hierarchal levels. All the organizations work based on mutual trust and cooperation. The detailed responsibilities are explained in table 1 (sh.gov, 2022).

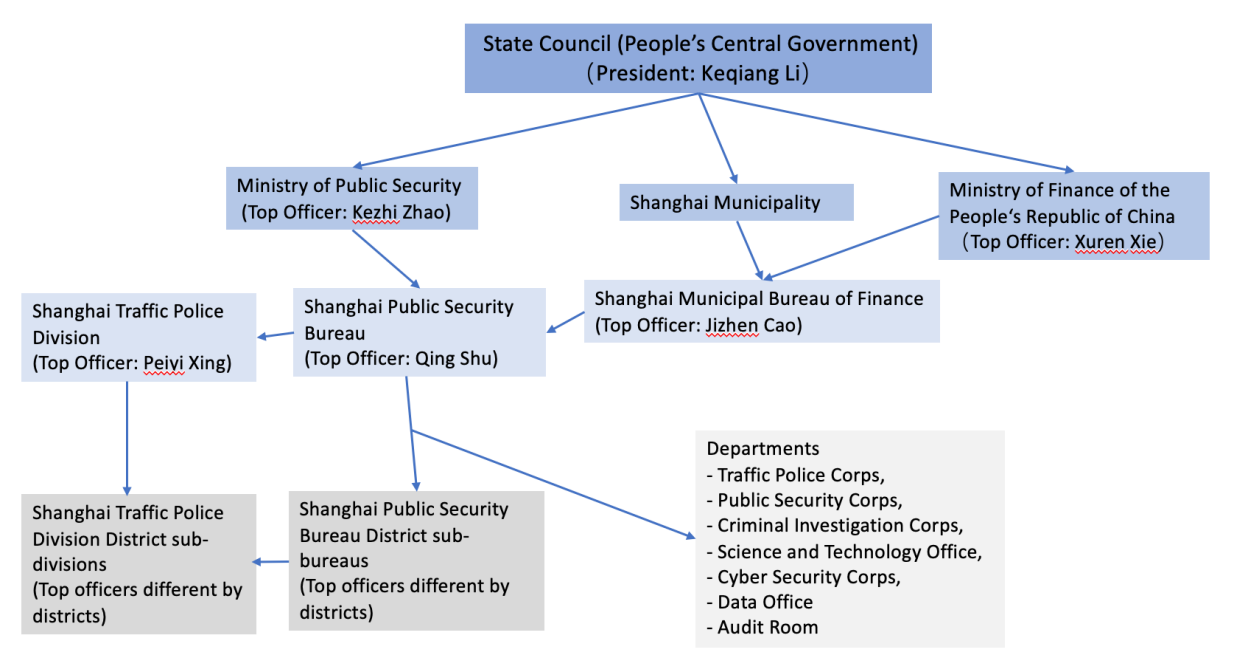

Figure 1: Organizational Structure of Shanghai Public Security Bureau

Table 1: Role of organizations involved in the Smart Policing System

Organizations	Roles
Chinese Central Government	Top officials that announce the overall development directions.
State Council	Its Ministries (e.i: Ministry of Public Security) set goals and implement policies.
Shanghai Municipality government	Assign tasks and coordinate between bureaus to meet the goals set by the state council.
Ministry of Public Security	It is responsible for the public and political security of China and oversees all Public Security Bureaus throughout all provinces, cities, municipalities, and towns of China.
Ministry of Finance of the People's Republic of China	Publish macroeconomic policies and the annual budget. It also deals with fiscal policy, economic regulations, and government expenditure for the state.
Public Security Bureau of Shanghai	Handles overall policing, public security, social order, and migration matters.
Shanghai Municipal Bureau of Finance	Implement laws related to financial work. It also formulates fiscal and taxation development strategies and organizes their implementation.
Shanghai Traffic Police Division	Responsible for handling traffic accidents, and maintaining traffic order. It also provides services related to vehicle license plates, driver assessment, and car safety inspections.

In 2016, the Shanghai Municipality government began to address the issue of non-motor vehicle violations and published the Regulations of Shanghai Municipality on Road Traffic Administration 3rd Revision. The reformation was a success under the leadership of the PSBS, for two years, there was a decrease in accident count (22.3%), death toll (13.0%), and the number of injuries (20.5%) (baidu.com, 2017). In 2017, the bureau started to adapt artificial intelligence into traffic policing, which incorporates facial recognition and virtual databases to identify lawbreakers. By early 2019, there was 75 AI facial recognition policing cameras across the city just to tackle traffic violations of non-motor vehicles. Currently,

there are about 1700 smart policing cameras across the city deployed by the Public Security Bureau of Shanghai.

The public-shaming system: A closer look

How are starts

Before 2017, the PSBS had been targeting non-motor vehicle traffic violations at a huge cost to the physical police force. The old method caused arguments between police and citizens due to human errors and bias. There were also chances that the police officers sent out more tickets till the end of the month since they need to complete their "sales".

Figure 2: Public shaming billboard (baidu.com)

As mentioned above, the bureau started to use public-shaming smart policing for traffic management in 2017. This system aims at reducing the burden of physical policing and target garbled ticketing. The AI camera will perform facial recognition on the violators and then "public-shames" them on an electronic billboard. What comes along with the caught-in-action pictures is personal information such as the last four dight of ID number and last name. At the current stage, the captured violations will be recorded in an online database with pictures available and explanations provided. If citizens were not happy with the fines, they can dispute on the PSBS mobile application directly. Until now, these devices can even recognize one's identity with a face mask on. The devices did improve the status of traffic violations, however, there have been reported incidents of unwanted exposure of personal information and misrecognition during COVID time.

Current Issues

Transparency

Currently, only officials can access the violation records. Unlike NYC, the government opens aggregated data to citizens on the NYC Open Data website. The PSBS only has open data for larger-scale information such as policies and regulations, but it does not give the public access to small-scale data such as violation counts and department spending.

The capital flow of the fine is also hidden from the public. While the government pays for all the funds needed for the installation of a smart policing device, the funds from the fine are said to be submitted to the Bureau of Finance, but no detailed records were found. As the figure shows below, the Division of Finance pays the partner company for launching the device, but where do the fines from the violation go, and which department gets the money?

Figure 3: Income flow from fine

Privacy and Use of Data

The public-shaming of PSBS using the smart policing devices already violated personal privacy: showing pictures, vehicle plate licenses, and even the last 4 digits of ID cards. While another possible privacy leakage is when granting third-party companies to access personal information databases. Currently, there's no comprehensive law on the implementation and usage of smart policing cameras. In other words, the citizens don't know anything about how their data was shared and how well their personal information was protected. The main partnership happens at the technology implementation state, a detailed industrial chain structure, which includes all related third parties, is shown in figure 4. From the flowchart, we can see the Data Provider will give data access to different sub-parties, and that's where one of the main concerns arises.

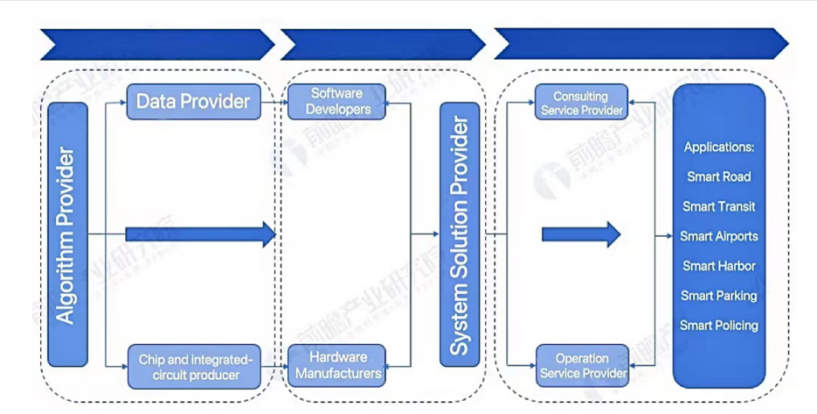

Figure 4: Industrial chain structure in smart policing (qianzhan.com)

Bias

There is a small chance of social bias since it's a machine, rather than a real police officer, to punish the lawbreakers. Machine bias might arise since the algorithm is kept private by a third-party company. For example, it's hard to tell how well the machine recognizes faces from different races, regions, ages, and gender. The machine might perform better at recognizing Shanghai citizens because the data used was more comprehensive.

Lack of prompt updates to citizens

The current technology is very widely used: an AI facial recognition camera will search the violators up in databases that store personally identifiable information. After the person is identified, a text message will be sent to the violator including a link that contains details of the fine and violation explanation. Since all the processes are done online, problems arise for people who do not have access to advanced technology. In Beijing in 2005, an elder who sells vegetables to make a living suddenly announced that he had 105 traffic violations in the past 10 months. This resulted in a total fine of 10,500 RMB ($1650), but he was not notified about any of the incidents during the 10 months (worldjournal.com, 2021).

Data and voices from citizens

Based on a survey of 326 citizens, 69% of them worried about privacy information leakage, and 19% of them questioned the accuracy and precision of these AI devices. Among all the respondents, 29% reported jaywalking before, 36% of them only heard of the smart policing, 47% knew a bit about this system, 14% knew the system relatively well, while only 3% were very familiar with this system. It's clear from the result that only a small percentage of the citizens are aware of what the system does.

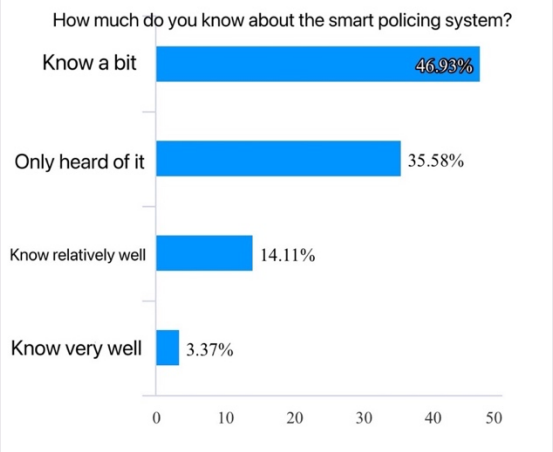

Figure 5: Citizens' knowledge of the smart policing system

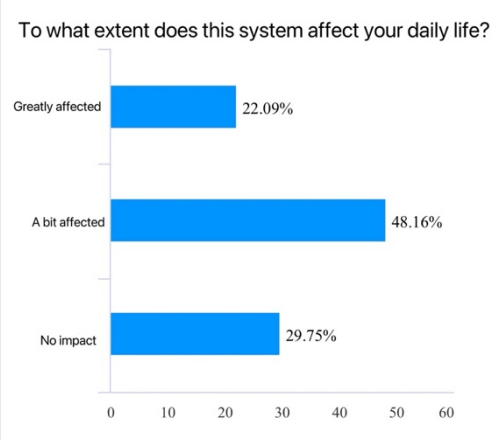

Figure 6: Impact of the smart policing system on daily life

Citizens also admit the impact brought by the smart policing system. 22% of the respondents indicate their life has been greatly affected, 48% were a bit affected, and 30% felt no impact on their daily life. We can see that most citizens were affected by the implementation of the smart policing system. But the question is, are their lives positively or negatively affected, and in what ways?

Given the scenario that the passengers were aware, that there were smart police monitoring the crossing, 61% of the citizens would pay attention and mind their behaviors, 31% were uncertain about whether they would care about the smart police, and 8% clearly showed they won't be bothered by the smart police. We can tell from the result that the smart policing systems do draw citizens' attention and change their behaviors. But does behavioral change equal the raise of awareness of road safety? It could also be a temporal change in behaviors to avoid fines and public shaming.

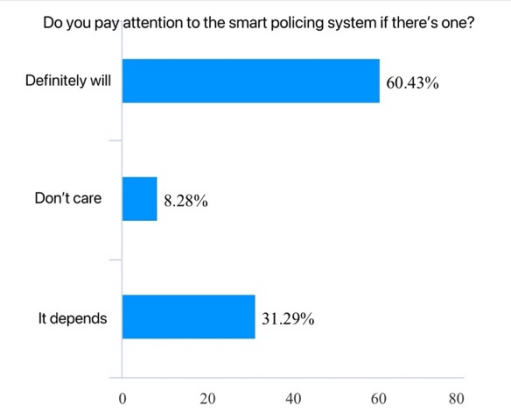

Figure 7: How behavior change based on the existence of smart police

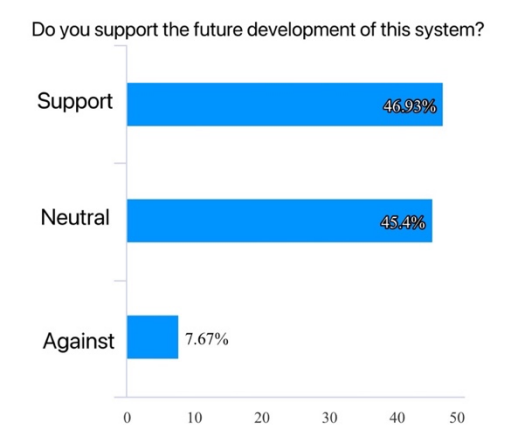

Figure 8: Supports for future development of smart policing

The survey also asked whether citizens will support the future development of the smart policing system. Among all the respondents, 47% said they will support the future development, 45% remained a neutral attitude, and 8% were against the future development. Almost half of the respondents showed support for the smart policing system, which can be a good sign if the Shanghai government can persuade citizens on the neutral side to support the system.

Strategies for Improvement

My proposal targets public concerns, sensitive data protection, device management, and the boost of smart policing technology in Shanghai. The plan takes advantage of the current technologies and resources available, so it would not be costly. The main goals are listed below:

Need for Data Transparency

It would be helpful to open government expenditure and income data to the citizens. This not only increases trust among the citizens and government but may also lessen the hidden corruption along the organization's hierarchal chain.

Reassurance of Data Privacy

Since the data is shared with third-party tech companies, the usage and accessibility of data are essential. To protect the personal information of the citizens and to gain more support for such projects, the government needs to establish regulations to ensure data privacy. At least, the citizens should be aware of where their data are going and who has accessibility to what type of information.

Increased Accessibility

It's debated whether the government should notify its citizens of new AI cameras launched since the citizens tend to behave well when they know there's a surveillance camera watching them. It's vital, however, to ensure the prompt delivery of violation information regardless of accessibility to electronic devices.

Innovated Technology

Other cities across the world have creative ideas to target traffic violations and raise the public's awareness of road safety. I'll borrow ideas from France, and a brief introduction is given below. This idea can be applied to Shanghai directly since Shanghai also has these billboards installed.

- **France**: the system also uses the idea of public shaming, but more creatively and gently. The technology makes the sound of a car screeching to a sudden brake when the jaywalkers try to cross the street. Then a poster with their terrified faces will be shown on the billboard saying "Don't take the risk of staring death in the face. Respect the traffic lights when you cross the road."

Figure 9: Terrified jaywalker on billboard in Paris (DIY Photography, 2017)

Partners and collaborators

This plan will have the PSBS keep collaborating with previous partners. Some big tech companies already in the collaboration include Tencent, Alibaba, and Baidu. The collaborators for smart policing in Shanghai could not be identified through the research. The list below shows all the companies involved in the current smart transportation technology in China, which provides a general sense of how many companies are involved:

Table 2: Companies involved in the smart transportation industry of China (Qianzhan.com)

Role	Companies
Algorithm provider	SenseTime, Tucson Future, Megvii, Yuncong Technology, Yuntian Life, Shenjing Technology,
Data provider	Torsi, Mass Data, Meiya Pike, UFIDA, Yihualu, DataJi Technology, Horizon, Broadcom Integration
Electronic Components Manufacturer	Intel, HiSilicon, Nvidia, Cambrian Shangta Technology, Tencent, Wen'an Intelligent, Thousand Vision Hong Kong, Aofei Data, Rongke Technology, Zhongxing Microelectronics, Shengbang Microelectronics, China Haiphong, Nalei Technology
Smart Transportation Hardware Manufacturer	Zongmu Technology, Hikvision, Qianfang Technology, Tianmai Technology, Dahua Technology, Uniview Technology, Infineon, Qingyan Microvision
Smart Transportation Software Developer	NavInfo, Yihualu, Sichuang Electronics, Traffic Control Technology, Unistron, Gao Xinxing, Fen, Kay Rucker, Alibaba, Shenzhen Dongke Baidu, Tencent, Jiao Technology, Neusoft
Smart Transportation Solution Provider	Dahua Technology, Jiadu Technology, Wanji Technology, Duolun Technology, Newland, Wuyang Parking, Infineon, Zhonghe Technology, Yuanwanggu, COSCO Haike, Jieshun Technology, Huashe Group, Saiwei Intelligent, Wantong Technology
Service Provider	Duolun Technology, Connected Vehicles Network, Mass Transportation, Fangwei Technology, Smart Valley, Saida Jiaotong, Parkes, Pinzhong Co., Ltd.

Proposal implementation steps

1. Educate the public about the smart-policing technology

a. Create an introductory website about the smart-policy technology:
    i. Function and cost of these devices.
    ii. Their locations and roles across the city.
b. Have partner companies' information on the website.
c. Clearly show the management flow chart:
    i. List out organizations involved and specify the duty of each entity.
    ii. Show the capital flow chart and budget summary
d. Publish reports on historical performances.
e. Include people without access to the internet:
    i. Introduce technology on TV channels.
    ii. Inform citizens in local newspapers.
    iii. Send out flyers to citizens.

2. Establish an Open Data Platform like New York City

a. The Shanghai Municipality government drafts a plan to have an open data platform
b. The Data Office and the Science and Technology Office should work collaboratively under the supervision of the Public Security Bureau of Shanghai to make the platform
c. Digitalizing historical data onto the open data website
d. Run beta version testing and notify citizens to try the new website
e. Gather feedback, bug fixes, and officially launch the platform
f. Work with smart policing tech companies for real-time data updates
g. Open information about the location of the camera, fines, and companies that are in charge of the smart-policing system
h. Keep updating by collecting public feedback

3. Publish regulations on managing smart policing related technologies

a. Regulations on data usage:
    i. To what extent can the data be used and transformed.
    ii. Indicate who has the right to use citizens' data.
b. Regulations on data privacy:
    i. Take punitive action if data leakage happens (fines, etc).
    ii. Reward if data are protected well (tax reduction, etc).
c. Regulations on corruption:

i. Open to public's report.
ii. Keep a record of all statements and fines.
iii. No mercy on any corruption incident.

4. **Upgrade current billboards**
   a. Gather the public's opinions on whether to show their faces to the public.
   b. Work with current technology companies:
      i. Design interface that does not show personal information (like Paris' idea)
   c. Cost estimate and plan execution:
      i. Create a full plan based on the budget provided.
      ii. Directly upgrade the current billboard.

Potential hardships

1. At the citizen level:

The Public Security Bureau of Shanghai can achieve most of the goals through online technology, while it can be costly to reach out to citizens without access to the internet. This plan also involves a lot of interactions with the citizens, the performance would be a constraint if there are not enough public opinions.

2. At the company level:

For partnerships, there's a chance that stricter regulatory rules can attract fewer partnerships or even lose current partnerships. It would be important to find a boundary that benefits the citizens, the government, and third-party companies. If the technology involved a lot of collaborators, it's also crucial to accurately identify who should take responsibility if accidents happen.

3. At the government level:

Since organizations under the hierarchal chain work closely with one another, it would be hard to target corruption if the parties involved are all hiding away their secrets. The worst case is that corruption happens at higher hierarchal order, which would be impossible to turn over since more power is held at higher hierarchal levels.

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