

2017—2018

**2017—2018
BAIDU
CORPORATE SOCIAL
RESPONSIBILITY
REPORT**



2017—2018
Baidu Corporate
Social Responsibility Report



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Baidu's vision is to be a top global technology company which best understands users' needs and enables their growth. Our technologies, products and services should be simple and reliable enough to become an integral part of people's everyday life. As a platform business, Baidu is committed to understanding users, empowering people and creating benefits to society, which is an endless pursuit. This has been a mission we have been dedicated to since commencing our journey and a path we will continue to walk as we enter a paradigm shift moment of the technology industry.

—Robin Li, Founder, Chairman and CEO of Baidu



EMPOWERING TALENTS

Baidu 百度



01 Empowering talents

Fresh graduates among new hires	30%
Employees from Double First Class Universities and Disciplines	20.08%
R&D staff	54.13%
Female employees	43.59%
International employees	0.38%
Average age of employees	29.48

02 World's top scientists at Baidu

Baidu established the Baidu Research Advisory Board in 2018 which welcomed nine world's top scientists. Among them were Dr. David Belanger, former Chief Scientist and Vice President at AT&T Labs and Alcatel-Lucent Bell Labs; David Forsyth, Professor of Computer Science at the University of Illinois at Urbana-Champaign; Mark Liberman, Distinguished Professor of Computational Linguistics; Martial Hebert, Director of the Robotics Institute at Carnegie Mellon University; and Vipin Kumar, winner of the ACM SIGKDD Innovation Award, the highest honor in the field of Knowledge Discovery in Database (KDD). Serving as advisers at Baidu Research, these internationally renowned experts bring to the board a wealth of research skills that will enable Baidu to produce more globally influential research results.

03 Baidu tops China's Artificial Intelligence (AI) patent list

Baidu leads the way in China in terms of the number of AI patents. The company has approximately 5,000 patents, including close to 650 artificial intelligence (AI) related and more than 4,000 non-AI related. Apollo, DuerOS, AI Open Platform, Baidu Cloud, and Feed, the key technology platforms of Baidu, have attained almost 100 patents.

¹Not including iQIYI employees



CSR GOVERNANCE



01 Caring employees

1. Training and development

In 2016 alone, Baidu held more than 1,500 online and offline employee training sessions, which translated to 200,000 study hours and covered over 80% of Baidu's employees. In 2018, Baidu recruited 46 additional internal trainers, taking the total number to over 400. These internal trainers provided close to 100 courses for employees, with an average of 200 employees per instructor.

(1) Baidu University

Mission	To empower employees, drive businesses growth, make Baidu stronger, and create a prosperous industry ecosystem
Vision	To become a benchmark corporate university in the AI era
Motto	Tear down barriers and keep evolving
Five Colleges	Baidu Management College; Baidu Institute of Technology; Baidu Content Ecosystem College; Alpha College

(2) Online learning platform: Du School

Du School, an in-house online learning platform launched in 2013, centralizes the top courses from different departments and allows employees to set their own timetables based on their own schedules. So far, more than 300 departments have a presence on the platform, generating 7,000-plus internally shared courses. On a daily basis, over 6,000 employees log on to the platform for online study. Since the Du School came online, the total online and

offline learning time of Baidu employees has reached 234 million hours.

(3) Joint training programs

"Baidu Growth Power", a course jointly developed by Baidu University's Taidu Program and Franklin Covey Company, was launched on September 10, 2018 to mark the inaugural Baidu University Day. The course was set up by internal trainers and "7 Habits" certified lecturers in eight stages over a three-month period, and gives a systematic training course tailored to Baidu employees. In order to present the course to employees in the best possible light, project team curated the course into a textbook with carefully selected content.

Eighteen employees became certified lecturers for the Growth Power course in 2018, whose 20 sessions in the year were attended by more than 1,300 employees. The course received more than 4,000 comments with over 500,000 words.

(4) Leadership training

Baidu developed systematic leadership training programs such as PBL, LDL, mini MBA between 2016 and 2018 and offered training to more than 10,000 managers of various levels with a cumulative study time of 2,500 hours. Baidu's leadership program has motivated managers to discuss and share their experiences, resulting in a valuable knowledge-sharing library with over 2.51 million words of management expertise. The company also conducts regular five-level leadership evaluation of executives and managers, which has assessed roughly 6,000 members of staff in regard to promotional opportunities. The endeavors have encouraged executives and managers to develop their management skills that help drive organizational changes.

2. Human Capital Index (HCI)

Baidu's Human Capital Index (HCI) is measured using data derived from the following four sub-indices: ERI (Employee Retention Index), HPI, OII (Organizational Innovation Index) and CVI (Core Values Index). The HCI is compiled by the feedbacks from over 20,000 employees at Baidu headquarters annually, 60,000 in total between 2016 and 2018, with an average response rate of 97%.

2018 marked the eighth year since Baidu applied the HCI, which is designed as a window through which the voices of the employees could be heard and suggestions on team and corporate management were collected. In line with Baidu's core values of being "simple and reliable", employees reveal their true thoughts via the HCI survey. The feedback received from the survey helps Baidu make up focused action plans based on the issues identified and improve its team management. For company-wide challenges, Baidu Executive Committee members oversee the implementation of corporate action plans devised to address them. By building on each development, it has become a driving force to improve Baidu's management.

3. The Cedar Plan

Baidu launched the "Cedar Plan", a commercial insurance programme, in October 2018, under which qualified employees that have worked at the firm for a specified period will be awarded hospital insurance for their parents, regardless of their age, social insurance status and health conditions. The insurance policies compensate for a high proportion of medicine and treatment costs and provide higher annual payouts. The Cedar Plan has so far provided insurance coverage to parents of nearly 30,000 Baidu employees.



02 Risk control

1. Data privacy protection

Baidu has put in place robust and clear values and principles to govern its data privacy protection efforts, striving to make users feel that “their information is protected, their choices are respected, and the service they are provided is valuable”. Baidu’s data privacy protection is guided by the following “Three C Principles”:

Consent: Baidu fully respects users and believes transparency is a precondition of respect. Therefore, when we collect users’ information, we must first notify them and obtain their consent.

Clarity: Baidu listens to users and explains to them the purpose, rules and scope that the company applies when collecting and using their information in a clear and concise manner utilizing animation and graphics, so that users are crystal clear about Baidu privacy policy.

Control: Baidu seeks to empower users and enhance user engagement; in doing so it grants them effective control over their personal information, adding preference configuration options for their private information, while presenting them with scenarios in which to withhold or disclose their personal information. Users can also easily access their personal information to review the data collected, and there are channels for them to make requests, complaints and appeals, enabling them to request updates, modifications, or deletions in regard to their data.

► **Baidu's initiatives and practices in data privacy protection**
Baidu has developed four sets of approaches to data privacy protection.

(1) Privacy protection system. Baidu has an across-the-company organizational system on privacy protection. At the top is the Baidu

Data Privacy Protection Committee, which is composed of Baidu's top decision makers. The Committee is in charge of the decision-making and strategy of major issues related to data privacy and responsible for the protection of user's data in Baidu, management of data cooperation and framework agreement with external parties, and compliance on cross-border data and national data, to ensure that Baidu's measures conform with the data privacy protection requirements of various regulations. At the bottom is each individual playing his or her role in privacy protection.

(2) Privacy protection process. Baidu has a robust review mechanism throughout the whole business which centers around PBD (Privacy by Design) and PIA (Privacy Impact Assessment). Baidu takes the privacy protection into consideration along the whole life cycle of its products/services and requires that business planning must be carried out simultaneously with privacy protection planning. Privacy impact assessment and privacy protection measures are launched together with data processing which involves high privacy risks, to ensure the implementation of three C-principles of privacy protection in the whole life cycle of data.

(3) Privacy protection technologies. Baidu has a whole set of security solutions and technologies to protect data security and user privacy, from the application, SDK and acquisition at the terminal end, to the encrypted transmission channel and transmission content encryption, and to the cloud end responsible for storage and release which has built-in situation awareness platform of privacy risks.

(4) Application of privacy protection policies in Baidu's products. Baidu has put in place a Master Privacy Policy and the individual privacy policy for each product/service; Baidu has also established a standalone data privacy protection platform (<http://privacy.baidu.com>), enabling users to understand Baidu's privacy protection values and strategies

or to give feedbacks through one integrated platform. At the same time, Baidu provides users with many privacy protection tips.

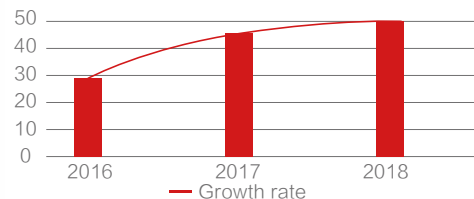
Meanwhile, to elevate employee's awareness of privacy protection, Baidu actively carries out privacy protection training for all employees from all business lines, and conducts at least one annual assessment for awareness of security and privacy, in which all employees must participate; as for management of suppliers and partners, before accepting any products or services from them, Baidu will conduct strict due diligence review on suppliers' compliance with data privacy policies, and select suppliers from multiple perspectives, such as legitimacy of data source and capability of data security protection; for partners relevant to data privacy, Baidu also has strict data security requirements, which will influence cooperation with them (or not) after privacy risk assessment.

By the end of 2018, Baidu had passed a suite data-related security certifications and reviews conducted by authoritative agencies at home and abroad, including but not limited to: Review of Grade-Based Security Protection of the Ministry of Public Security, ISO20000 (Information Technology Service Management System) Certification, ISO27001 (Information Security Management System) Certification, ISO27018 (Data Protection Standards for the Cloud) Certification, ISO27017 (Cloud Security Management System) Certification, and ISO29151 (Code of Practice for Personally Identifiable Information Protection) Certification. On December 30, 2018, China Cybersecurity Review Technology and Certification Center officially issued Certificate of Personal Information Security Management System to Baidu Cloud and Baidu Map, which are the first domestic products certified as Personal Information Security Management System.

2. Content ecosystem governance

Baidu has developed proprietary content ecosystem technologies with high precision to tackle harmful information on the Internet. They include basic and other “killer” and disruptive technologies that are constantly updated. In 2018, Baidu incorporated a variety of algorithms, including human-assistance machines and data-backed models to process billions of words, pictures, videos and other information, which were thoroughly scrutinized prior to the production of content, during and after its publication. Faced with a new network environment in which information is updated in real time, manual inspections have become insufficient. Dubbed as the new era of artificial intelligence, 2018 saw Baidu apply AI vigorously in order to achieve the intelligent recognition of natural languages, frame-level inspections of pictures and videos, and identify speech in real time. Baidu has devoted considerable manpower and computing power into this effort, continued to improve algorithms based on massive data, and restructured and improved models and architectures in order to maintain a clean Internet environment free of harmful information.

In 2018, Baidu effectively dealt with and took down over 50.22 billion instances of harmful information. In terms of harmful information, information related to pornography and gambling ranked first, accounting for 53.81% and 15.25% of the total respectively.



Harmful information taken down by Baidu (Unit: billion)

► Case Study: “Baidu Green Search with Voice Recognition for Children” project

Baidu Content Security Center and Baidu Search initiated a project entitled “Baidu Green Search with Voice Recognition for Children”, which was designed to prevent harmful information from appearing on children’s Baidu search pages. The system crawls the Internet in real time, filtering harmful information out and keeping the content that is suitable for children. Baidu Search applies AI technology in speech recognition to help with these efforts. The system can automatically identify voices to evaluate whether the children conducting the voice search for education, entertainment and other information are under 12. If they prove to be so, the system will direct them to the children’s search pages.

In addition, Baidu monitors web offerings including texts, pictures, videos and other forms of presentation, to ensure that the children mode function is operating effectively at all times.



Baidu Search Mobile edition: the left is the page for the general public; the right is children mode

3. Combating commercial corruption

Baidu has set up a Professional Ethics Department and a Committee of Professional Ethics comprised of its senior executive staff. They are mandated to investigate and follow up on violations of professional ethics and codes of conduct, and make sure the appropriate punishment is doled out according to the relevant regulations, and to report regularly to the company’s management.

The company has also opened up a channel for the reporting of fraud and corruption, as it endeavors to reduce and eliminate encroachments and promote Baidu’s professional ethics. The external reporting mailbox is “bdjb@baidu.com” and the internal one is “neibujubao@baidu.com”.

Baidu has also enacted a series of rules of professional ethics and norms, including the “Baidu Professional Ethics and Code of Conduct”, the “Baidu Professional Ethics and Code of Conduct of Employees”, “Avoidance of Conflicts of Interest”, the “Management Regulations of Crucial Undisclosed Information and Insider Transactions”, “Avoidance of Private Agreements”, “Reporting Systems and Procedures”, and “Reporting and Anti-Reprisal”. These documents are published on the companies’ intranet, and are accessible to all its employees. All employees—including senior managers, consultants and board members and staff at its subsidiaries and affiliated companies must abide by these rules. Furthermore, all Baidu employees must take a professional ethics examination on an annual basis and sign the “professional ethics commitment” disclosure. They also must participate regularly professional ethics training and awareness raising campaigns. Also, internal controls are put in place to ensure that the company’s rules and regulations are strictly adhered to and implemented within the realm of legal policies. In addition, Baidu advocates the active promotion of integrity and fair trade among related parties and

requires every business partner to sign its “Agreement of Integrity and Fair Trade”. The Agreement stipulates that partners must abide by the principles and requirements of the Agreement to ensure that the business partner follow the laws and regulations and the strictest code of ethics in business, thus averting fraud in any forms.

Baidu is committed to its corporate philosophy of being “simple and reliable”, as it looks to create an honest and open working environment. Employees that violate rules are punished fittingly in accordance to company policies and state laws. Baidu’s Committee of Professional Ethics sends e-mails to all employees to notify them of violations on a regular basis. In 2016, 20 serious violations were reported in which 33 employees were dismissed after investigations. In 2017, 13 serious violations were alerted to all staff and 20 employees were dismissed. In 2018, 22 serious violations were identified in which 78 employees were dismissed. For 23 employees suspected of violating laws over the last three years, in addition to terminating employment, Baidu also voluntarily reported them to the judicial authorities. Following a determined crackdown on various forms of internal corruption over several years, and the continuous promotion of professional ethics, the overall situation at the company has maintained a strong and positive momentum.



03 Environment protection

1. Measures and performance of self-built office buildings in energy conservation and environmental protection

No.	Energy-saving project	Description	Results	Note
1	Conditioned air Storage	Baidu has adopted conditioned air storage technology in its corporate premises. In summer, it has the capability to lower building temperatures during periods of reduced power loads at night, and utilizes the previous cooling volume during periods of high power loads in daytime to supply cooling to the central air-conditioning system, thus reducing the power load during the peak periods of power consumption. The disparity between the peaks and troughs of an electrical grid can be effectively reconciled. And the low power load will be compensated by the peak power load, effectively saving on power consumption and cutting electricity costs.	Saving 4 million kilowatt hours of electricity in a year	Baidu Headquarters; Technology Park Campus

No.	Energy-saving project	Description	Results	Note
2	Recycle of Energy from Air Conditioners	A fresh air system recycles part of the cooling and heat to save on energy used. In summer when cooling is required, it recycles the cooling capacity to save on power consumption; in winter, it recycles heat and saves the natural gas.	Electricity saved during summer: 1.8 million Kilowatt hours; Natural gas saved during winter: 150,000 cubic meters	Technology Park Campus
3	LED Lamps	Baidu's offices have been installed with a large number of LED energy-saving lamps. Compared with ordinary fluorescent lamps, they save approximately 580,000 kilowatt-hours of electricity a year.	Electricity saved yearly: 580,000 kilowatt hours	Technology Park Campus
4	Solar Energy Heat Collector	The solar energy heat collector has a total heat conversion area of 1,178 square meters, which provides hot water for domestic use and reduces the use of natural gas.	Heat was same as consumption the same period in 2017 (while the number of employees in Technology Park Campus increased by 16%).	Technology Park Campus

No.	Energy-saving project	Description	Results	Note
5	Rainwater Harvesting System	Three rainwater-harvesting ponds (300 cubic meters in Building 2, 500 cubic meters in Building 4 and 400 cubic meters in Building 5) have been built at Baidu's Technology Park Campus (Phase II), in a total of 1,200 cubic meters.	The annual rainwater recycling accounts for about 2,400 cubic meters	Technology Park

2. Baidu electric shuttle bus for employees

- ▶ **Passenger Figures:** In 2018, the total number of commutation trips on Baidu electric buses was about 3 million, and the average number of trips per day was close to 12,000.
- ▶ **Number of buses:** 86.
- ▶ **Energy Conservation and Emission Reduction:** From January to November 2018, the total distance traveled by electric shuttle buses was 899,536 kilometers, the daily average was 3,500 kilometers, and the average mileage of each bus was 40 kilometers.

3. New energy vehicle charging piles

- ▶ **Number of charging piles:** A total of 74 charging piles were installed from 2016 to 2018.

- ▶ **Number of vehicles charged:** 154 per day.
- ▶ **Energy Conservation and Emission Reduction:** Reducing the Carbon Emission by 2tce per day



4. Baidu Data Centers

Baidu Data Center powers its search services, cloud computing, big data, and artificial intelligence businesses. The Center has put saving energy and reducing energy consumption high on its agenda, aiming to develop itself into a green data center by taking a holistic approach. It has innovated and applied many energy-saving technologies to software architecture, hardware equipment and overall infrastructure (electrical system and HVAC system).

Baidu Data Center has obtained more than 400 technology and innovation patents at home and abroad, and is seen as a pioneer and leaders in China's push to build more energy-saving data centers in the country. As the first double 5A energy-saving data center in China, the Baidu Cloud Computing center (Yangquan) is widely recognized as a trailblazer in the industry, powering Baidu's critical businesses.

(1) International-leading PUE (Power Usage Effectiveness)

Since its launch in 2014, Baidu has been dedicating to build low-carbon, energy-saving and environmental-friendly cloud computing data centers, and has applied energy-saving technology to boost energy efficiency on an ongoing basis. In 2018, its average annual mono-mode PUE reached 1.09, ranking it first in China and far exceeding the industry average of 1.73. Compared with the average PUE of 1.73 for data centers built during the same period in China, the energy efficiency of Baidu's infrastructure has increased by 88%. Since September 2018, the whole Yangquan data center has been put into operation, which is expected to reduce electricity consumption by 250 million kilowatt hours per year, corresponding to the electricity usage of 130 thousand families in China.

(2) Effective energy-saving measures

- ▶ The data center's electrical system is different to traditional structures: it has adopted a mode of using commercial electric supply as the main source and redundant electric supply as backup. The power supply efficiency is as high as 99.5%, which provides for maximum power conversion efficiency and saves 42 million kilowatt hours of electricity annually.
- ▶ The data center deployed China's first batch of whole cabinet servers with built-in lithium batteries. This took power efficiency

up to 99.5%, and it integrated the electromechanical element with IT. The deployment of high-density lithium power meant recovering 25% of the space, and led the industry in a new direction in regard to distributed power supply technology.

- ▶ The data center is actively utilizing clean energy. During 2017–2018, it used 81 million kilowatt hours wind power, which reduced carbon dioxide emissions by 80,000 tons.
- ▶ The data center was the first in China to use non-elevated flooring, combining OCU, AHU, IDEC, and plate liquid cooling with various air-conditioning terminal technologies. The natural cooling period for the whole year exceeded 96%, and only 4% is needed to switch on the cooling mechanism.
- ▶ Baidu also employed AI in its data centers. Thanks to a deep learning process, the data centers' cold source operation mode, operation frequency, and the intelligent decision-making technology of the air-conditioning terminal, free cooling time was prolonged and intelligent heat dissipation was realized. Through the monitoring of system equipment, errors in the system could be predicted and targeted, meaning maintenance could be carried out in advance to improve processing efficiency and ensure the data center's safe, efficient and stable operation.





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MISSION-DRIVEN SUSTAINABLE DEVELOPMENT

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01 Technological innovation

Search

Baidu is the leading Chinese language Internet search provider , dedicated to providing people with access to information in the most convenient way. Baidu has the world's greatest number of Chinese web pages, and handles billions of search requests from more than 100 countries on a daily basis. Baidu also serves as a platform for companies to acquire potential consumers, and provides information search and management solutions for large enterprises and public institutions.

Baidu App, a mobile application that offers “search” and “information” , has 700 million users. The application combines search function with smart personalized recommendation services to provide users with rich and practical functions. Baidu Search allows users to access its services whenever and wherever they want through channels including Baidu Webpage, Baidu Image, Baidu News and other vertical search channels. In 2018, Baidu App launched smart mini-program functions, which made it a leading domestic comprehensive platform of content consumption and service.

2017.10

Baidu's Q3 financial report revealed that Baidu's core business, driven by the dual forces of “search” and “feed” , had continued to making progresses on product innovation. Mobile searches could provide more direct and richer content, such as video and music.

2017.11

Baidu App released its new slogan “Use it whenever you want” . The cumulative number of activations of Baidu App has now exceeded 2 billion.

2018.01

“Mobile Baidu App” officially changed its name to “Baidu App”.

2018.04

“Baidu App” released mini-program functions.

2018.05

Baidu launched the “Simple Search” app.

2018.10

Baidu's Q3 financial report revealed that over 40% of users thought the first Baidu search results matched their demands.

2018.11

Baidu App had 160 million daily active users, 6 billion search responses per day, and it had generated 15 billion pieces of information feeds per day.

2018.12

Baidu Smart mini-programs Open Source Alliance was formed and the total monthly active users of the founding members of the alliance reached 3 billion.

Apollo



Apollo, Baidu's autonomous driving platform, provides an open, reliable and safe platform for its partners to develop their own autonomous driving systems through on-vehicle and hardware platforms.

2017.07

In July 2017, at Baidu Create 2017, Baidu unveiled Apollo's roadmap, technical framework and the performance of Apollo 1.0.

2017.12

In December 2017, Baidu signed a strategic cooperation agreement with the Administration of Xiongan New Area, Hebei province. Under the partnership, Apollo will help build the new city into a leading city of smart mobility in the world.

2018.01

In January 2018, before the opening of the International Consumer Electronics Show (CES), Baidu released Apollo 2.0 at Baidu World US stop, which achieved autonomous driving on simple urban roads.

2018.04

In April 2018, BYD, a pioneer of China's new energy vehicles, became Apollo's 100th partner.

2018.07

In July 2018, at Baidu Create 2018, Baidu and bus-maker King Long jointly released the world's first L4 volume-production autonomous driving minibus "Apollo Minibus", with the production exceeding more than 100.

2018.09

In September 2018, Apollo announced that it would release the world's first open source Vehicle Infrastructure Cooperative Systems, marking Apollo entering a new stage of the open source development of vehicle and road infrastructures as a whole.

2018.11

In November 2018, Baidu partnered with carmaker FAW Hongqi to build the first L4 autonomous-driving sedan for volume production in China. It also unveiled mass production plans, under which a small quantity release is planned in 2019 as an experimental operation, followed by a wider launch in more cities in 2020.

DuerOS

DuerOS is a conversational AI operating system that can support a wide range of hardware devices such as mobile phones, television sets, speakers, household appliances, automobiles, and robots. DuerOS allows users to control and command their devices with voices, enabling them to conduct 10 major categories of services such as inquiring for information, asking for directions, creating reminders, and enjoying entertainment and smart home applications. DuerOS has skillsets for 15 scenarios including life services, parenting, video and entertainment. DuerOS is now available on 70 million smart household devices of more than 85 brands, and is becoming a control hub for smart homes. At present, DuerOS voice assistants have more than 30 million audio programs, more than 3 million children's audio programs, over 2,000 audio programs produced by provincial and municipal radio stations, and more than 800 life services functions. Baidu's smart hardware products include the Xiaodu Smart Display, the Xiaodu Smart Speaker, the Xiaodu Smart Speaker Pro and the Xiaodu car mount.

2017.01

At the 2017 CES, DuerOS was officially released, marking the beginning of the age of conversational AI operating systems.

2017.07

Baidu released the DuerOS open platform at the Baidu Create 2017, enabling the smart devices with natural language processing capabilities.

2018.03

Baidu released its first smart household video speaker, Xiaodu Zaijia, with the latest Baidu DuerOS conversational AI operating system.

2018.06

Baidu officially released its first smart speaker, Xiaodu Smart Speaker, dubbed as the Baidu AI housekeeper.



2018.07

At the 2nd Baidu Create, Baidu officially released DuerOS 3.0, which had three key elements: upgraded natural conversational interaction, a brand-new conversational content service ecosystem, and integrated business models.

2018.09.30

DuerOS speech queries exceeded 800 million. According to an IDC report on smart speakers, in the third quarter of 2018, sales of the smart speaker with Baidu DuerOS ranked first in the Chinese market. The smart hardware of Xiaodu grew fastest in the Chinese market, with its market share increasing to 24%, and the volume of shipments increasing in line with the rate of growth.

2018.10.31

DuerOS ran by more than 35 million active devices per month. The number of DuerOS partners exceeded 300, and the operating system were active on more than 160 devices. The number of developers on the DuerOS platform exceeded 24,000. All these numbers top their respective ranking lists in China.

2018.12.31

The number of activated smart devices with DuerOS exceeded 200 million, ranking it No. 1 in China.

Baidu Cloud

Baidu Cloud, an intelligent cloud computing platform for enterprises and developers, is committed to providing ABC (Artificial Intelligence, Big Data, and Cloud Computing) for all industries. Baidu Cloud has released more than 100 products and more than 30 solutions, empowering the intelligent transformation in finance, media, games, manufacturing, education, urban and public safety, logistics and other fields.

2015 Baidu Open Cloud was officially released.

2016 Baidu officially released its cloud computing strategy, consisting of “cloud computing + big data + artificial intelligence”.

2016.10 Baidu Open Cloud was upgraded to Baidu Cloud.

2017.05 At the Baidu ABC Summit, Baidu released the ABC Inspire technological identification and ABC-Stack, the leading cloud service system in China. Baidu unveiled 90 skillsets of its AI platform, 9 skillsets of big data, and fundamental cloud services.

2018.07 According to the Q3 China Public Cloud Report Areleased by consulting firm Forrester, Baidu Cloud, with a rapid growth rate of revenue and market share growth, was listed as the Strong Performer.

2018.09

At the Baidu ABC Summit, ABC 3.0 was released. Nine products, including the ABC Model Factory, the ABC Intelligent Customer Service Solution, the AI Development Platform Tianyan, and the ABC Robot Platform, were launched to expand the ABC intelligent portfolios.

2018.12

Baidu Cloud became the first to announce the source opening of edge computing in China.

Baidu Brain

Baidu Brain is a collection of Baidu's AI technologies and business practices accumulated over many years. It includes key AI technologies such as visual, voice and natural language processing, knowledge domains and deep learning. Baidu Brain serves to support all Baidu's businesses and help partners and developers via Baidu AI's open platform, aiming to accelerate the application and development of AI technology and enrich the AI technology ecosystem. It also aims to empower other industries and businesses to transform themselves to embrace emerging industries and new business.

- 2016.09** Baidu Brain 1.0 was put in place with basic capabilities, and opened its preliminary core technologies.
- 2017.07** At the Baidu Create, Baidu Brain 2.0 was unveiled with a complete system including the basic, perceptual, cognitive and platform element, demonstrating more than 60 core AI technologies.
- 2018.07** Baidu Brain 3.0 evolved to a stage of “multi-modal deep semantic understanding”, completing its presence in deep learning frameworks, AI stack technologies and comprehensive ecosystems. It also showcased more than 110 AI technology skillsets. The number of speech module users increased by 94%, while visual direction users had quadrupled by 416%, and NLP operators had increased by 180%.
- 2019.01** Baidu Brain released close to 160 AI technology skillsets, serving more than 900,000 developers.

02 Giving Back to Society

Commitment from the CEO

- ▶ Baidu founder and CEO Robin Li and his wife, Dr. Melissa Ma, announced on April 28, 2018 that they would, together with Baidu, donate RMB 660 million to Peking University to celebrate its 120th anniversary, jointly setting up Peking University Baidu Fund. The fund will mainly support frontier researches in Peking University's leading disciplines, which include information science, medicine, economics, communications, psychology and sociology. Those subjects are considered as cross-field disciplines that could utilize the application of AI, which are closely aligned to Baidu's aspirations and vision for the AI industry.
- ▶ Robin Li is an avid advocate of tobacco control. As a member of the 13th National Committee of the Chinese People's Political Consultative Conference, he proposed a nationwide ban on indoor smoking in 2018 during the annual session of the top political advisory body, as well as strengthening legislation for tobacco control and raising public awareness. Li also delivered a speech at the World Conference on Tobacco in 2018, calling for the use of technology to address this global challenge and build a smoke-free world. As an ambassador for the World Health Organization's tobacco control program, Li has been campaigning to eliminate smoking in workplace. On “World No Tobacco Day” in 2018, Baidu unveiled the world's first AI-powered smoking control application, which received strong support and won recognition from both the World Health Organization and the Chinese Centre for Disease Control and Prevention.

CSR Initiatives

- ▶ In 2017, Baidu partnered with the NGO Getting Babies back Home (Baobeihuijia.com) and Xunqin.mca.gov.cn, a Ministry of Civil Affairs website designed to report missing people, to launch a campaign aimed at locating missing persons. Through the utilization of AI-empowered facial recognition technology designed to help families find their missing loved ones, a total of 5,249 families had been reunited with their nearest and dearest by December 2018. Those located included Fu Gui, who had been reported missing for 27 years, and Wang Qifeng, who had been missing for 24 years. The people found also include Zhang Junhong, who had been missing for 8 months, and Zhu Chengshi, who was declared missing for 1 year, and Yang Guilai, who had been reported missing for 4 years. Baidu expanded its AI-powered missing person locating initiative with more parties in 2018. As a result, its facial recognition technology has been applied at 2,000 social assistance stations nationwide to help keep track of the homeless community. Baidu also helped Xunqin.mca.gov.cn develop a mobile application to help find missing persons.
- ▶ In November 2017, the Baidu Content Security Center took the lead among a number of other Internet firms and founded the Coalition to End Online Wildlife Trafficking, aiming to reduce online wildlife trafficking. On June 22, 2018, Baidu and the International Fund for Animal Welfare (IFAW) jointly launched the DU AI Biodiversity Initiative, a campaign that aims to bolster the awareness of biodiversity through popularizing science and knowledge among the public, via online and offline engagement, content generation and target-user initiatives.
- ▶ On May 22, 2018, Baidu Charity and the China Soong Ching Ling Foundation launched the Building the Dream for the Future Initiative, a charity program set up to protect children

and juveniles in poverty-stricken areas. The program has thus far benefited 48 schools through the creation of intelligent virtual classrooms, which provide pupils with smart equipment as well as quality education and teaching resources, and access to online and offline teaching activities.

- ▶ On August 8, 2018, Baidu Charity, along with Baidu App, Haokan, Baidu Search and other business units, partnered with China Soong Ching Ling Foundation, the China Children and Teenagers' Fund, and the Kindle Blue Fund to launch the Public Welfare Star Initiative. This was a charity program aimed at building a better future for children.
- ▶ On February 7, 2018, Baidu Foundation, together with Baidu Map, teamed up with Ren Millet, or Desert Millet, to launch Du Farm. This was a public philanthropic program dedicated to green mobility. Built on Baidu Map's 500 million-plus user base and over 70% market share, Du Farm has successfully drawn millions of users to engage in green mobility activities, including the retention of approximately 230,000 tons of water in Alexa. While promoting public awareness of green mobility, the program has also embarked on further propelling the implementation of groundwater resources conservations initiatives in desert areas. On September 28, the words "Du Farm" lit up NASDAQ's spectacular digital billboard in New York, further highlighting the power of public welfare to the rest of the world.
- ▶ On January 25, 2018, Baidu Charity officially launched the Baidu Cultural Heritage Guardian Program, an initiative dedicated to the protection, inheritance and innovation of traditional culture through public service engagements. The program leveraged on Baidu' AI technology to protect and promote China's rich heritage. It also leveraged on Baid's content ecosystem and its alliance partners to promote China's

traditions and culture to the rest of the country, thus raising awareness and cultural self-confidence among Chinese people. So far, using AR technology and image data, it has completed the restoration of 21 national cultural program recordings in nine Chinese provinces.

- ▶ In 2018, Baidu Foundation joined hands with the One Foundation to establish the Yichang Charity Network, a program that is intended to improve neighborhood relationships and promote diversity in communities. Initiatives introduced include educating community residents on public service, engaging in the development of mutual aid platforms, and organizing a Yichang Charity Day. To date, the network has 10 provincial-level regional support centers with 126 member institutions, covering over 1,000 communities in 21 provinces (municipalities) and 60 cities throughout China.



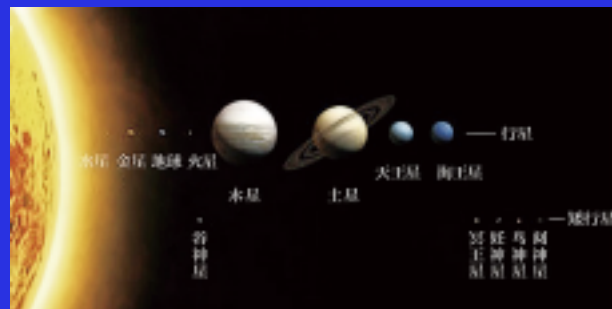
Volunteer Activities

- ▶ In July 2018, Baidu Foundation established a volunteer initiative within Baidu to coordinate the design, planning and support of employee volunteer activities. This initiative encompassed volunteer development, volunteer recruitment, on-the-job training, and the development of incentive system. The program has provided a solid foundation for volunteer engagement at Baidu and allowed the company to establish a corporate-wide volunteer system. The company's first offline volunteer recruitment campaign attracted 2,000 candidates, with 921 ultimately registered as volunteers. Successful volunteers have received professional training, and Baidu has subsequently offered them access to a range of activities such as a Science & Technology Summer Camp, Building the Dream for the Future initiative, and Used Clothing Recycling, etc., which have won the company-wide recognition. In December 2018, Baidu officially unveiled its Volunteer Platform to provide employees with information on public service programs and advice on how to better engage in social activities. As a result, the new platform has allowed the company to better integrate its corporate resources, leverage its industry advantages and fulfil its corporate social responsibility.





Find out more
with AR scan
on Baidu APP !





GROWING WITH PARTNERS

Baidu 百度



Wang Yunchen,
user of Baidu since its foundation in 2000

“
Baidu is already part of my life.
”

The job of Wang Yunchen, a product maintenance manager at a finance software company, is to visit clients across Beijing from dawn to dusk.

“The first thing I do when I go out is open Baidu Maps to check for traffic jams on my route,” says Wang.

Born in 1987, Wang was studious as a child and had strong curiosity.

“I asked so many questions as a teenager that my parents sometimes avoided me. Then I would nag my sister, who would hit me out of annoyance. My father bought her a computer when she went to college in the summer of 2000. On one occasion when a question I asked irritated her, she put me in front of the computer and typed my question in the text box before a realm related text appeared on the display,” recalls Wang. He was amazed by his first Internet experience.

Most households did not have broadband Internet access at that time. Wang's home used dial-up Internet-access, which involved the modem making a unique noise. It was then that he remembered “Baidu”, which did not operate an independent page, but was linked to a web portal.

“I learned how to search for information with Baidu in 2001.” says Wang. He often fought with his sister over the computer.

Wang quickly became hooked on gaming, like many of his peers. He was a big fan of rare games, like brain-teaser puzzle games.

“When I was stuck at certain levels, I would search for tips on Baidu,” says Wang.

He soon found Baidu was a treasure trove that provided access to all kinds of resources and had answers to myriad questions. He made friends with other gamers at Baidu Tieba, an interactive forum-like platform where like-minded people gather to discuss their topics of interest.

Wang landed an IT industry job after graduating from college in 2009. He gained a deeper understanding of the Internet and software through working in the industry for several years.

“Our products should help make people's work and life easier,” says Wang. He also experienced how Baidu simplified tasks like smart searching, which replaced manual input with voice interaction.

Wang is thankful when thinking about the past two decades. Baidu was not only part of his youth, but an element of his life as he grew up.

“The time I spent on Baidu has grown from one minute a day initially to at least one hour a day now. I check the feed, read novels and have made using Baidu a habit. Baidu is now a part of my life.”

Wang Jiayi,
primary school student in
Beijing's Shijingshan District

“

**The world will be a joyful place
in the future.**

”

Two memorable things happened to Wang Jiayi, a seven-year-old girl in Beijing, in January 2019. Firstly, she was elected her science class teacher's assistant. Second, she realized her dream of roaming in future.

What would the world look like in the future? An answer was provided by a visit to an AI-themed joint project by Baidu and Haidian District of Beijing held in Haidian Park. Wang was amazed by the many awe-inspiring spectacles on her first visit to the theme park.

“Attention: The car is turning around.” As the Apollo-powered driverless car slowly arrived at the station near the west gate of Haidian Park, Wang's eyes widened. The semi-circle outline of the car seemed like a jellyfish to her. It reminded her of a cartoon spaceship when the car door opened.

“There is really no driver in the car,” recalls Wang. During her first ride in an autonomous driving car, she found there was no steering wheel, no windshield wiper, no driver's seat, only a row of seats arranged in a circle.

After all the passengers were seated and seatbelts buckled, the staff in the car closed the doors by tapping a tablet. Then the journey slowly began. The ride was smooth and quiet.

“Who is controlling the car? Will it bump into pedestrians?” she asked.

A young man in the car calmly answered her questions, explaining that the car could avoid obstacles and plan routes by itself with sensors like radar that were installed throughout the car.

Ms. Wu, Wang Jiayi's mother, said her daughter had no idea what a radar was, but could understand that it was a device that functioned like eyes and ears.

The Apollo bus slowed down and stopped when it encountered a pedestrian lingering on the road. As the pedestrian walked away, the car started up again slowly. Wang, watching the process, applauded.

The bus then took the girl to the park's “future space” section, where she saw the actual futuristic space. She loved the science class and daydreamed about it often.

Xiaodu, a smart speaker developed by Baidu, acted as the receptionist at the gate and an encyclopedia for visitors' questions. It was also an excellent guide, introducing Wang and other kids to the “future home” section, where various daily needs like opening the curtains, turning the lights on and off and playing music on the speaker, etc. could be voice-controlled via Xiaodu.

Ms. Wu said her daughter was amazed by the “future space”, where she was fascinated by the section's many AI devices, including a teaching device for Taichi, one of the Chinese traditional martial arts, on a large screen showing the moves of Taichi. By stepping on

certain spots on the ground, the AI assistant captured users' moves with sensors, and compared them with the master's moves on the screen, and allotted scores to the users. Wang cheered as she scored 1,100 points with her moves.

Tired after the game, the mother and daughter bought drinks from an automated vending machine that uses facial recognition technology to receive payments and sat in a pavilion installed with a Xiaodu smart speaker on a hill nearby that played songs. By saying “Xiaodu, Xiaodu”, visitors could wake the speaker up and interact with the pavilion. The pavilion told jokes, revealed the weather forecast or sang a song. Wang requested a song titled Calorie and happily danced to it.

After a tour around the park and trying all the AI devices, Ms. Wu asked her daughter what she thought of the experience. Wang replied: “The world will be a joyful place in the future. I will recount the story of Xiaodu and the future world to my classmates at school.”





Chen Weiqiang,
technical director of Xiamen King Long
United Automotive Industry Co., Ltd.

“

Though the bus had no gas pedal or brake pedal, I am really relaxed; it is safe and reliable.

”

“Is the bus safe?” “How does it drive?” The first group of tourists inquired about the special bus, when encountering it for the first time at Longling Mountain Eco-park in the development zone of Wuhan on December 14, 2018. They were about to take the shuttle bus from the gate of the park to Shilihua Hill.

The bus, named Apolong, is the world's first mass-produced L4 autonomous bus. It had no driver or steering wheel, not even gas or brake pedals.

Chen Weiqiang, technical director of King Long, a leading bus maker in China, who was involved in the R&D and production of Apolong, said that with its three sets of radar systems and six cameras, Apolong could normally identify obstacles 100 meters away. “It independently completes the whole process of identification, braking, stopping and restarting,” says Chen.

King Long had worked on the project for eight years to make a bus that operates independently of a driver.

With the rapid development of AI, King Long was an early innovator, aware of emerging transformation of mobility in the future and that its future rivals may not be players in the same industry. The situation is comparable to how traditional phone makers lost market share to smart phones. King Long decided to start early and be the first mover.

In 2011, King Long began the research and development of forward collision avoidance systems and a lane departure warning system, which are considered the building blocks of autonomous driving.

“The systems were quite rudimentary, as they were based on audio, optical and electric signals sent by vibrating seats and steering wheels, horns and signal lights. The pre-warning system failed to assist driving,” recalls Chen.

Despite many R&D setbacks and challenges, King Long persisted. “Just like China has taken the lead in new energy vehicle technology boosted by national policies, we similarly are in a leading position for autonomous cars,” he says.

A turning point occurred in April, 2017, when Baidu launched the Apollo program, an open platform on which its autonomous driving technologies were shared with developers and auto-makers. The initiative, Chen says, greatly reduced the threshold for driverless car R&D.

King Long immediately got in touch with Baidu looking to forge a partnership, which Chen says is a win-win alliance between two leaders in their respective markets. “We value Baidu’s leading technology advantages in AI and software, which we combine with our abundant experience in coach and bus making,” Chen says.

Baidu soon dispatched a technical team of dozens of experts to



King Long as part of the R&D partnership. They decided to develop a brand new model, Chen recalls.

“Real autonomous driving is not simple re-adaptation. We must remove things like the steering wheel and pedals,” he explains. This was easier said than done. “We were then faced with the new challenge of how to test drive a car without a steering wheel and pedals. We started with a simple steering wheel and pedals, then shifted to wired joystick control, and eventually evolved to wireless joystick control. That solved the problem,” he adds.

The Apollo platform-based Apolong takes autonomous driving one step further. “It is no longer just about pre-warning systems etc., but about directly taking control and steering autonomously,” says Chen.

The 100th Apolong rolled off the assembly in July 2018, marking the mass-production of Apolong. It is now seen in many places, such as Shenzhen, Pingtan and Shanghai, apart from Haidian Park in Beijing. “We received overseas orders for Apolong, and companies from Singapore, Canada and Japan have been talking with us about partnerships,” says Chen.

Many autonomous Apolongs shuttle employees to and fro between a dozen stops every day at King Long's campus, which covers an area of more than 53 hectares. Chen sometimes takes the Apolong to go around the plant. “I am really relaxed; it is safe and reliable.”

Du Lin,
a visually impaired person

“

You are my eyes, helping me feel the changes of the four seasons.

”

Du Lin, born in a village in Sichuan province in the 1990s, is an energetic and optimistic young man. However, he has never seen the sunlight, because his “eyes were damaged by an illness as medical treatment wasn't available in rural areas back then,” he says.

Visually impaired people are more eager to learn about the world than people whose vision is not impaired. Du is no exception. He is accustomed to using his ears to experience the world. “I ordered Xiaodu online last year as soon as it was launched,” says Du, referring to the smart speaker device developed by Baidu. As a tech-savvy person, he wanted to try Baidu's first self-branded smart speaker the moment it became available.

He bought a few Xiaodu smart speakers in one order. “Sometimes when I say Xiaodu, the speakers respond together,” says Du. He assigned different jobs to them, for example, one as a house-keeper and one accompanying him to the office.

Xiaodu wakes Du up every morning and reads the latest weather forecast as soon as he asks what the weather will be like that day.

Du juggles multiple jobs, running his own company while working as a part-time masseur. One Xiaodu that he takes with him to the office reminds him of his schedule, like when he's due to meet a client. "One of Xiaodu's greatest merits is it organizes my schedule and reminds me. It excels the human brain in that regard," says Du.

Du likes cooking dinner upon returning home. Xiaodu is able to quickly search for recipes and reads each step to him. He has learned to cook braised pork belly by following instructions from Xiaodu. The dish is delicious. Xiaodu is a master of cooking for him.

Du loves history and world geography. He often asks Xiaodu to read the history of the Qin dynasty to him at home. Xiaodu gives him a lively narration so that he can imagine the armed soldiers and horses under the command of Qin Shi Huang, the first emperor of China and creator of the Terracotta Army.

Once Du asked Xiaodu what Italy's Venice looked like, and as he listened, he asked Xiaodu what the time was in Venice. Xiaodu told him it was 2:30am, and Du told Xiaodu to keep a low voice in case it disturbed people whilst they slept.

Du now feels he can't be apart from Xiaodu after getting to know it for over half a year. He asks Xiaodu all sorts of questions on a range of topics, e.g. weather, people's profiles, major events, archives, etc. Xiaodu can also play games. It can even give instructions for exercises, which Du follows. It plays music that helps Du fall asleep or reads novels in the evening before Du goes to sleep.

For Du Lin, Xiaodu is a life assistant and a versatile teacher. With the search engine Baidu as its brain, its knowledge is almost boundless. "Xiaodu is like my eyes. When I am with Xiaodu, I feel I am like the center of the whole world," says Du.



**Gong Huaze,
CEO of McFly, an AI and big data
service provider focused on smart agriculture**

“
**Equipped with Baidu Brain, the
drone is able to complete several
tasks in one flight.**

”

In the video clip, a drone is flying over a rice field of 133 hectares in Panjin, Liaoning province, spraying pesticides on the crop. “This is precision pesticide distribution powered by AI remote sensing technology,” says Dr. Gong Huaze, CEO of McFly, a smart agricultural big data service provider, referring to the clip.

Dr. Gong, who earned his PhD from the Institute of Remote Sensing and Digital Earth (RAD), Chinese Academy of Sciences (CAS), entered the agricultural industry in 2015. His goal then was to employ remote sensing technology in the farming sector. With a large population of 1.3 billion, China boasts an enormous agricultural sector, but the industry is highly vulnerable to crop diseases and plant pests. If disease prevention and pest controls are not put in place effectively, the consequences for the agricultural industry could be catastrophic. Therefore, the scientific and strategic application of pesticides would be a significant step towards securing the successful harvesting of crops.



For rice farmers, the week prior to earing is the most important period for spraying pesticides. This is crucial to the successful garnering of the rice. At the same time, a multitude of pests sit poised to feast on the tender sprouts in the fields.

Traditionally, spraying pesticides has been an extremely labor- and time-consuming task, and spraying the chemicals evenly is a real challenge. However, by utilizing drones carrying remote sensor equipment, farmers can effectively conduct a precise scan of their fields, leaving the pests with nowhere to hide. Once the data has been collected, the drone can spray the pesticide in a more effective and targeted manner.

Remote sensing technology has been enhanced for the application of disease prevention and pest control. “We used to need to fly the drones twice, the first time to collect data on diseases and pests, and the second time to spray the pesticides based on the data,” Gong explains.

“By partnering with Baidu, Baidu Cloud was able to combine two flights into one with the use of AI-empowered drones. McFly essentially migrated algorithms from the cloud to the drone by utilizing the edge-computing framework powered by Baidu Cloud. The map monitoring diseases and pests is generated in real time during the flight, and precision spraying of pesticides is executed immediately once this data has been gathered. “Our costs have been further reduced by collecting data and spraying pesticides in a single drone flight,” says Gong.

Gong embarked on seven months of field research in rural areas in China before founding McFly. During this time he developed a deep understanding of the challenges farmers face. Thanks to the Baidu Cloud-powered AI remote-sensing technology, farmer can now monitor plant pests and crop diseases and eliminate them with

pesticides in a more precise and effective style, thus reducing the consumption of pesticides by 50%. “We have launched the technology in Liaoning, Hubei and Jiangsu provinces. More farmers, seeing the benefits of AI remote sensing technology, have started to believe in McFly and have approached us with a view to employing our services.”

Gong believes the partnership between McFly and Baidu was significant. The AI-powered remote sensing technologies have helped farmers cut their costs and safeguarded their harvests, thus bolstering their profits. The precise pesticide spraying enabled by the technology means consumers can worry less about the food they eat, as there will be no excessive pesticide on the crops. The techniques employed also help protect the environment, especially the soil and water.

Jia Ruoceng,
an undergraduate of Department of
Philosophy at Peking University

“

The study of the ethics of AI is an important dimension of philosophy.

”

Even though she was a digital disciple, Jia Ruoceng never imagined she would have connection with Robin Li, founder of Baidu, or that there could be a connection between philosophy and AI. This all changed when she turned out to be one of the 25 winners of the 2017–2018 Peking University Robin Li Scholarship.

“My first impression of Robin Li? Handsome!” she says light-heartedly. “He is a successful but modest man,” observes Jia, who is from Mianyang, Sichuan and now an undergraduate student of the Class of 2017 in the Department of Philosophy at Peking University.

Jia came across Robin Li during her optional course, Guided Reading of Classic Works, a course offered by the Department of Information Management, which according to her course tutor, is where Robin Li graduated from. “I really admire him. He founded a company using his expertise and was awarded a patent for hyper-link analysis,” says Jia. But what she didn’t realize was that “Li is so passionate about philanthropy.”



Robin Li, founder of Baidu, and his wife Dr. Melissa Ma have supported three philanthropic projects at Peking University: The Robin Li Scholarship; The Yenching Academy Robin Li Scholarship; and The Peking University Baidu Fund, to which the couple and Baidu donated RMB 660 million to set up in 2018.

“Part of the money I received for my scholarship will be spent on tuition and dorm fees for the sophomore year, and I will spend some of it on a trip abroad during the winter vacation, and a new camera for myself,” says Jia.

The reward of a scholarship was the result of Jia’s hard work and enthusiasm. “I have yet to determine what I want to do in the future, so I have studied hard in many different subjects, and I’ve also worked in the student affairs department and associations,” says Jia.

This dedication to hard work has paid off handsomely. Jia was top of the Class of 2017 based on the credits she received and her comprehensive quality assessment at the end of her freshman year. Following a process of submitting application, first review, receiving public notification, and undergoing a final review by the scholarship review committee; she was finally awarded the Baidu scholarship.

“Many think philosophy is about metaphysics or origin of the world. However, nowadays, I think philosophy tends to pay more attention to daily life and technology,” Jia says. After receiving the scholarship, she has also started to focus on Baidu and AI. “So what kind of AI is ethical? And, how would ethical AI be accepted by the public and build public trust?” Jia believes philosophy is closely related to AI. She says: “It is an important dimension of philosophy: What we can do and what is off limits. Those are some of the meaningful propositions.”

**Zhang Heng,
founder and CEO of Tuge,
a Shenzhen-based cloud
communications platform**

“ I trusted my elderly father who lives alone in Toronto with this device. ”

The Baidu Wi-Fi Translator was launched in February 2018. Zhang Heng, founder and CEO of Tuge, a Shenzhen-based cloud communications platform, who is one of the gadget’s joint development partners, immediately sent one of the devices to his father, a non-English speaker who lives alone in Toronto. His father tended to spend a lot of time in the house because he was worried about getting lost if he went out.

“Now he has the courage to go out,” Zhang says. “He proudly tells local people that the translation device his son helped develop can now help other old people who are in the same situation.”

The Baidu Wi-Fi Translator allows people to ask for directions in a dozen different languages. Zhang points out that this means people like him no longer have to worry about things like parents getting lost, wherever they are in the world.



Just press a button and speak into the device in whatever Chinese dialect you speak. The translator will be able to comprehend what you are saying and translate it into the target language for others to hear.

The Baidu Wi-Fi Translator is widely recognized to be an amazing translation tool that offers users three distinct advantages.

First is Baidu's AI technology, which includes Baidu voice recognition and synthesis and neural machine translation (NMT). This allows it to accomplish smart translations, with accuracy of up to 97%, which is equivalent to the College English Test-6 in China standards. Second is Baidu's massive data base. And third is the enormous range of application scenarios developed by Tuge. The device's machine-learning capabilities allow it to actively increase its range of vocabulary, which means the more it is used, the number of scenarios it can be used increases. Wherever people go, they rely on the Baidu Wi-Fi Translator to deal with whatever language barriers they are presented with.

As well as offering accurate translation, Baidu Wi-Fi Translator can also access the Internet on its own. Many people get perplexed on foreign visits, as they have no idea how or where to access Wi-Fi. "So the companies have equipped the device with our latest technology: cloud communication," says Zhang. This technology integrates the device with the communications resources of over 400 telecom operators around the world, and ensures an automatic internet connection when Baidu Wi-Fi Translator is switched on.

According to Zhang, Baidu Wi-Fi Translator is mainly targeted at those who live abroad but do not speak the local language, for example: Bearinger's staying in New York, and New Yorkers staying in Beijing. The customer base is now growing at a rapid rate. "I trusted my father to the device, so you know how much I trust it," adds Zhang.

Li Yingming,
software developer

“
Baidu's AI open platform quickly
helps you realize your dreams.

”

Li Yingming arrived early at the Xuhui District Administrative Service Center in Shanghai on October 15, 2018. Twenty-four government automatic service machines, designed by a team led by Li, were put into action that day; an important component of the government's automatic service hall.

The government's automatic service machines amalgamate various forms of self-service equipment, offering 12 functions that includes video consultancy, identity verification and much more. It can process 654 government service items from 29 departments, and has gone from being an 8-hour service to becoming a round-the-clock facility.

Li was excited and a little nervous on the launch day. “I was curious to see how the machine worked in actuality, whether we had solved all the problems, and if any new problems would arise,” he says. Li was encouraged by the feedback he received: It was easy to use and saved time and effort.

It took Li almost two years to develop the government's automatic service machine and put it into operation.



He first came across a government automatic service machine when he joined a government electronic service company in November 2016. This machine offered rudimentary interaction via a touch display but users found the experience of using it to be underwhelming. It often failed to provide access to the services people were looking for. This often led to them having to line up and submit original copies of the material to staff, essentially diminishing on efficiency instead. As a result, the government's single-function automatic service machine is often underused.

Li often contemplated possible solutions to the inadequate interfaces provided by the original government service machines before finding some inspiration from watching Baidu Create 2017 (a forum for AI developers)'s online streaming in the summer

of 2017. Tens of thousands of developers were using a range of features offered by Baidu's AI open platform, including voice recognition, facial recognition, knowledge graphs, natural language understanding, and user profiling.

Li had a gut feeling that this could be the solution. "Why not power the government service machines with AI technology?" he asked himself. Li began working on the technology, which involved interacting with the AI community in regard to problems he was encountering. Finally, he was able to smooth out many of the bumps in the road with the help of AI technology. For example, the machine could deliver tutorials to users by means of cartoons, videos, and audio guides. The needs of the user are pinpointed through the conversation. In addition, the technology could determine whether the materials submitted by the user met with its text recognition and machine learning capabilities. The new systems have greatly improved operational efficiency and lowered the demands on manpower considerably.

At present, Baidu's AI open platform contains 151 technical features, and is used by over 800,000 developers such as Li. He spends two to three hours a day learning from and communicating with other developers using the platform. As a beneficiary of AI, he is a keen advocate of the technology. "I hope I can share my experience and give back to the community," Li says. "My hope is for other developers to quickly realize their visions with the help of AI in the same way that I did."



Scan the QR code for more information about Baidu Brain.

Cui Zhongwei,
chairman of Beijing Leadertech
Intelligent Equipment Corporation

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A smart part-sorting robot is as efficient as up to 10 humans.

”

The smart parts-sorting robot assembles tiny components around the clock at Leadertech Intelligent Equipment Corporation's workshop.

"This is a new model based on the Baidu PaddlePaddle deep-learning system," says Cui Zhongwei, Leadertech's chairman. It is faster and more stable than human workers, with the same degree of recognition accuracy. A smart parts-sorting robot is as efficient as up to 10 human workers.

With the progress being made in industry automation, it has prompted Cui, an expert in machine vision AI technology research, to think about how robot accuracy and global open AI platform searches can be improved.

Taking into consideration location, technology and other factors, Cui decided to partner with PaddlePaddle, a deep-learning platform developed by Baidu.

Baidu subsequently assigned a tech team to Leadertech's plant to collaborate on R&D. Leadertech's robot is essentially a tool for enhanced productivity, which coordinates between optical systems



and intelligence. By upgrading the robot's intelligence, Paddlepaddle has bolstered productivity significantly.

After 10 months' intensive elaboration on PaddlePaddle, Leadertech conceived iBrain and its next-generation smart parts-sorting robot. "Compared with the last generation's 0.05% acceptance error rate and the 5% discard error rate, the new technology delivers a 0.01% acceptance error rate and 1% discard error rate, which is comparable to results based on human labor," Cui adds.

He believes that in addition to increased efficiency, the partnership with Baidu has also improved the firm's business and sales models.

Leadertech used to sell the complete product as a single unit packed with the necessary algorithms. Now the algorithms are stored on the cloud. "Customers can procure the apparatus and subscribe to iBrain on the cloud for an agreed period. iBrain is upgraded, and is becoming smarter, on an ongoing basis. It really is a sales upgrade."

Undoubtedly, the explosive development of AI technology will play an increasingly important role as industry evolves and upgrades. "I believe our partnership with Baidu demonstrates a significant implementation of AI in the manufacturing sector. It provides powerful proof that AI can empower quality control in the industry," notes Cui.

Professor Xiu Yu,
School of Computer and Information,
Anhui Polytechnic University

“
When a person's life is saved, I am
full of pride.

”

Professor Xiu Yu of the School of Computer and Information at Anhui Polytechnic University was troubled by a news story during his last summer vacation. A university freshman had watched an online swimming video and decided to go swimming alone in Furong Lake, which is close to Shen Mountain. The freshman, who was without any safety or first-aid equipment, narrowly avoided losing their life thanks to the timely intervention of a local swimming coach.

Anhui Polytechnic University is located in Wuhu, Anhui, an area with an abundance of water-based activities as it lies in the downstream area of the Yangtze River. Every summer there are new instances of young people getting drowned, as a result of swimming in unsupervised areas. This is despite the university placing warning signs and banners throughout its grounds and close to notoriously dangerous swimming sites. Being the supervisor of big data and the AI association, Xiu found himself asking: Could AI technology help improve safety and prevent these drowning incidents from happening?"

The question triggered heated discussions among association



members, who decided to form a team dedicated to the safety initiative comprised of faculty and students. Through analyzing the determining factors of the previous drowning incidents, the team discovered that safety management, or lack of it, was a key component in each incident. It found that pre-warning systems would provide the most effective means for prevention. Guided by Xiu, the team proposed utilizing facial recognition technology in order to pre-warn people in the vicinity of dangerous waters. However, as they conducted more experiments and delved deeper into solving the problem and, they realized the plan was flawed. Given that the cameras would have to capture a clear facial image, the warning system was rendered redundant if they failed to do so. In addition, it would be difficult for this method of facial recognition to be effective as so many walkers frequent the areas in question.

Coincidentally, the team was to participate in the 2018 China Collegiate Computing Contest–Artificial Intelligence Innovation Contest, where they first encountered PaddlePaddle, which utilizes Baidu’s open source deep-learning architecture to deliver an easy-to-use, safe, efficient, distributive deep-learning platform.

As such, the team decided to approach the problem from a different perspective. One of the main differences between pedestrians and

swimmers is that pedestrians are fully clothed. And to recognize and warn a partially clothed individual on land would be easier than trying to warn someone already swimming in the water.

After several rounds of discussions, the professors and students agreed on a target recognition pre-warning approach. By integrating deep learning, IoT and other technologies, it put in place a complete process for the target recognition of outdoor swimmers, featuring automatic voice alerts, analysis and decision-making on the cloud, to enhance the management efficiency of outdoor water activities.

Given that the deep-learning capability commands a massive amount of imagery data, the team gathered a large amount of video footage of people swimming in dangerous waters during their summer vacations. Based on the collected and pre-processed data, the students built the target recognition model through leveraging on Baidu’s PaddlePaddle open-source architecture. “It used to be difficult for new undergraduates to attain high-precision target recognition. However, with PaddlePaddle, there is no need for them to concern themselves with the underlying algorithms associated with deep learning. They now only need to concentrate on the model’s upper layer,” explains Xiu. Now the team is focused on optimizing the solutions and has submitted application for two relevant patents as part of this process.

Statistics show that approximately 57,000 people drown in China annually, and that drowning is the top cause of accidental death among its young population. Xiu has full confidence in the subsequent deployment of its outdoor swimmer recognition and warning system. Technology comes at a price while human life is priceless. “When a person’s life is saved, I am full of pride,” he says.

Guo Mei,
data tagger

“
**Data tagging makes me keep up
with the world.**
”

Guo Mei, 33, didn't think she would ever land another job after leaving the workplace for two years to get married and give birth. But she did, and now works in the IT industry as a “data tagger”, a profession she had never heard of before.

Despite having industry experience, it took Guo a while to learn the ropes in her new job, which entailed tagging the lane for autonomous vehicles. Fortunately, the firm provided her with a week's orientation training. During this period, Guo was given a consignment of images of roads that had been depicted with solid and dotted lines. Along with her colleagues, she was asked to tag features to the lines and upload the updated pictures.

Easier said than done!

There are usually 1,000 pictures in one consignment. At first, Guo could only tag as 200 to 300 pictures in a day, whereas her more senior colleagues could complete a full consignment.

“I didn't want to rush, so I remained patient and made progress steadily,” says Guo.

She soon picked up speed and was tagging 700 to 800 pictures a day.

Now she is even faster, tagging over 1,300 pictures a day, and often topping the ranks for single items.

“Practice makes perfect,” says Guo, admitting she now feels a real sense of accomplishment.

As well as driving up business, Guo's salary also increased. The data tagging work has given her a better understanding of today's world and the direction it could be heading in in future. “I had no idea what autonomous driving or AI was,” says Guo. Now she is accustomed to autonomous driving tech terms such as car lane lines, 2D obstacles, and semantic segmentation.

Guo's efforts are central to the AI services that are making everyone's lives easier. And these AI services are backed by a huge training database, with a huge number of data taggers working behind the scenes.



Baidu Shanxi AI Fundamental Data Tagging Base introduces a tiered data tagging industry cluster composed of articles from tagging teams to specialized tagging enterprises. This base was established to promote data tagging as well as AI-based industry upgrades to enterprises in Shanxi. In doing so it became a working paradigm of data tagging in Shanxi in the age of AI, and generated new forms of business development in the process. It also created a considerable number of new job opportunities while leading the development of AI industry in Shanxi. Shanxi Linnuo Internet Technology Co., Ltd., where Guo works, is part of this industry cluster.

Baidu Shanxi AI Fundamental Data Tagging Base is expected to attract 10% of China's data tagging industry enterprises over the next three to five years. In doing so, it is expected to generate RMB 5 billion in revenue and directly create 50,000 new jobs. It will engage relevant companies upstream and downstream in areas such as IoT and building information modelling (BIM). The base will also incubate innovative companies, and lead the upgrade and transformation of related local industries, which is predicted to be worth tens of billions of yuan.

**Wang Chifeng,
inheritor of Jin
an intangible heritage about kite-making**

**“
Jin Kite has flown beyond
Shichahai in Beijing to every
corner of the world.
”**

The story begins in early 2019 during an unusually cold spell in a downtown area of Beijing called Shichahai. Set on the banks of a picturesque lake, the formerly bustling area seemed to have been abandoned. However, this was not the case at the courtyard of 12 Nanguanfang Alley, home to Jin Kite inheritor Wang Chifeng. Through a street-facing window, pedestrians could see kites hanging, an eagle kite being the most eye-catching of them all. Wang, who is close to 70, loves making eagle kites, and is known to be the master in this particular trade.

Wang has been kept busy lately, with people flocking to his home to learn kite making. “I asked them how they knew about me. They told me they learned of me through Baidu's news feed,” Wang says. It used to worry him that so few people were interested in learning about kite making. Now the number of people displaying a genuine interest in learning the craft has pleasantly surprised him. “I don't care about the apprenticeship. I treat everyone who comes to me as a guest, and teach them how to make kites,” he says.



“Southern Beijingers adore sand martin kites, while Northern Beijingers prefer black wok bottom-style kites. Those are the two main schools of kite making in Beijing, and Jin Kite belongs to the latter,” Wang says, while relaying the origins of Jin Kite to a room full of students, “The kite features sharp black and white contrasts and is very popular with people. Jin Kite originated in the royal palace and the craft began to circulate amongst common folks following the last Qing Dynasty Emperor’s abdication.”

Wang began to learn kite making from the older members of his family when he was seven. He was sent to work in the rural areas of Inner Mongolia, and then to Qinghai in 1968, before finally returning to Beijing in 1990. As to why he likes making eagle-shaped kites, he says that it stems from when he worked in rural villages, and would lie on the prairie watching eagles circling above during his break. At one point he nurtured an injured eagle, thus building



a special bond with the animal, and he now has a good knowledge of eagles and how they fly. As a result of this, he was able to make improvements to the kites; he even created a technique for flying kites when there was no wind.

Wang remembers the first few years after returning to Beijing, when he earned his living selling kites from a street stall. “No one wanted to learn kite-making from me then, because they don’t want to work in a street stall like me,” he says. Wang was concerned that Jin Kite craft would end with him. It was only when the government began supporting the inheritance of intangible cultural heritage that people began inviting him to showcase the craft of kite making. Back then it was a small operation, and he had no ideas on how to promote himself.

It wasn’t until Baidu launched a free tailored in-feed ad for Jin Kite that things began to look up. “Baidu’s feed precisely targeted people interested in kites precisely; those that had searched for kites we drawn to my advert,” Wang says with a big smile.

Baidu launched a public charity project, Craftsmanship in China-Baidu Crafts Masters, in early 2018. By leveraging on its online feeds, the company has greatly empowered the inheritors of intangible cultural heritage. Every day Baidu’s feed pushes relevant content from inheritors directly to a target audience, which is enthusiastic about traditional culture in different forms, e.g. picture, text, and video. These groups are selected based on the analysis of the big data derived from browsing intelligence and the profiles of hundreds of millions of active Baidu users. Users will see this targeted content when deploying relevant Baidu products. This in turn helps improve the recognition of intangible cultural heritage and increases the exposure of its inheritors. Meanwhile, the contacts and geographic locations provided can expedite the process of connecting interested parties with the inheritors.



“I used to worry no one would want to learn the craft. Now I am not sure if I can handle so many students!” says Wang. Driven by Baidu Feed, Jin Kite has flown beyond Shichahai in Beijing to every corner of the world.

Zhu Feng,
tracks down missing family members

“

Despite the photo bearing a 90% similarity to my missing uncle, the man in the picture did not look much like him...

”

It was a foggy day in October 2016 when Zhu Chengshi, a speech-impaired man suffering from hearing loss, went missing from his hometown of Fuyang in Anhui. His family searched over a 40 to 50km radius tirelessly, but found no clues as to his whereabouts.

A year after Zhu had gone missing, his nephew Zhu Feng came across a means of tracking down missing people via the internet, and published a notice relating to his uncle. Volunteers took heed of the notice and uploaded a photo of Zhu to China's national missing family search site (<http://xunqin.mca.gov.cn>), which is operated by the Ministry of Civil Affairs. Zhu's photo was compared to others on the database using Baidu facial recognition technology. The system came up with four possibilities, photos that bore various degrees of similarities to Zhu. Among them, one bore a 90% similarity to him. The volunteers immediately informed his nephew of the result.

Zhu Feng and his family were wary of the result attained by the volunteers. “The man in the photo with a so-called similarity of 90% did not look much like my uncle. He had a different body shape and a



round chin, whereas my uncle has a sharp chin. Besides, my uncle got lost in Taihe. How could he possibly have gone so far?” Zhu Feng questioned.

The man in the photo was in Heze, Shandong province—300km from Fuyang, Anhui, where his uncle went missing. Nevertheless, with faint hope the family called the assistance station in Heze where it was further confirmed that the man in the photo had hearing loss, was speech impaired and had a slight limp. With so many shared features, they were almost certain that the man registered as “Dang Hemin” in the assistance station was Zhu Chengshi, their missing family member.

It only took three days from publishing the notice to being reunited with their uncle. This new technique for searching for missing relatives crossed the barriers of time and geography. When the family failed to accurately identify their uncle, it was big data and AI that established his identity, thus transcending the limits of people and existing technology. Civil affairs authorities say helping homeless people and

vagrants' return home to their families is an important aspect of civil affairs. The staff at the assistance station usually compare photos, determines accent and detect physical features to establish missing persons' identity. However, this process is both time and labor consuming, and achieving accurate matching can be difficult.

Baidu worked with the China's national missing family search site via the Ministry of Civil Affairs in 2017 to address the challenges faced during the manual recognition of missing persons' process. Users only need upload a photo of the missing person onto the site, and with the help of Baidu's facial recognition technology, it will compare the photo against the data of tens of thousands of aid recipients in almost 2,000 assistance stations in China to come up with the most likely matches. This process improves the chances for successfully finding missing persons significantly.

Currently, facial recognition features are used over 200 times a day during missing person searches, with comparisons of 90% accuracy accounting for one tenth of the total. The partnership between Baidu and the national missing family search site has enabled real-time matches based on the demands of searching relatives. Along with the data held on aid recipients by China's assistance stations, the new process reduces search times considerably. Baidu's AI people-searching mini-program was launched in January 2019. Users have direct access to its photo library on the national missing family search site, <http://xunqin.mca.gov.cn>, to make comparisons via their mobile phones. Leverage this technology is making the entire search process more effective.

Currently, more and more people are understanding and utilizing AI person search technology. With further technology upgrades, it will make for a smoother and more convenient method for people to track down their missing relatives.

Li Lu,
a wheelchair-bound writer

“

Baijiahao is like a special shoebox or treasure trove...

”

Since she was paralyzed in an accident at six, a special shoebox that is her whole world has sat on her windowsill. She also sees Baijiahao, Baidu's platform for independent writers and bloggers, as a special shoebox...

A big, empty courtyard surrounded by cold, stonewalls—that was all Li Lu could see of the outside from her room at six. She kept all her treasures in a special shoebox on the windowsill. There was some coloring pencils and paper in the shoebox, with which she sketched everything she experienced at home.

Before her accident, Li had been an active girl. She could even climb higher than most of the boys. But this all ended abruptly.

She will never forget the hot and windy day in which it happened. She fell from the slope, injuring her spine and constricting the nerves, leaving her completely paralyzed. Li's childhood ended brusquely in that moment, and she was forced to spend her life in a wheelchair.

Li learned to write on her own and she published her first novel online at 16. From then on nothing could stop her. She enjoyed writing film and theater reviews and quickly attracted an enthusiastic audience for



her unique thinking and elegant writing. Her encounter with Baijiahao helped her hit new heights in her writing career.

Li says she discovered a wider world on Baijiahao, where she made more friends and discussed her plans and mutual topics of interest with them. As she gained more exposure, Mengshen Mumu, stars such as Liu Yan, Wang Dalu, and Zhao Wenzhuo endorsed her account on Baijiahao. This provided her with the opportunity to meet and interview these celebrities, and she went on to pen a series of blockbuster articles as a result.

Li recalls how her room of a dozen square meters used to be her entire world as a child. All her cherished belongings were places in the special shoebox on the windowsill. When her friends came to visit her on weekends, she would open the special shoebox and share her treasures with them, among which were her colorful drawings.

Old habits die hard, and Li still places her most cherished belongings in different boxes as a reflection of her life and her world.

Li considers Baijiahao to be a shoebox too; a bottomless, inclusive box with an unending stack of colorful papers, on which anyone can write their own thoughts. The special shoebox is essentially a treasure trove: a place in which to store different opinions and snippets of information. If you put your dreams in it, it may yield wealth.

Content creators can effortlessly publish articles, photos, and video on Baijiahao, which will distribute the content via multiple channels such as Baidu App, Baidu Search, Baidu Browser, etc. Baijiahao offers various mechanisms for monetization, including ad breaks, native advertising, thumbs up, etc. Over 1.6 million content creators had joined Baijiahao as of November 2018, and

a daily average of over 15 billion items are recommended on Baidu App feeds. In the year since Li joined Baijiahao, she has posted thousands of articles that have attained over 100 million views. With over 110,000 followers, she has established herself as a celebrity writer.

She recalls that she may also have put persistence, hard work, confidence, happiness, etc. into the special shoebox.

Yang Xinjun,
a pioneer of camellia seedling in Youxian
county of Zhuzhou, Hunan province

“

**Baidu Tuiguang first helped us
open up the market.**

”

Yang Xinjun has always considered 2012 to be a watershed year. He raised RMB 3 million from farmers in Youxian county of Zhuzhou, Hunan and commenced with a camellia seedling business. However, due to the farmers applying unsuitable fertilization, the field of camellia seedlings covering a 2 hect-ares area, reaped nothing.

Yang didn't give up though and picked where he had failed. Leading a team comprising five partners and raising two rounds of funds, he attracted dozens of farmers to join his new venture, the Xinlan Seedling Cultivation Co-operative. The seedling cultivation industry then was based on social networking and word-of-mouth when it came to the purchase and sale of the seedlings. Therefore, the price of acquiring information and good faith in the business was extremely high, while trade efficiency was rather low. Having learned that the brick and mortar economy was increasingly tied to the internet, Yang decided to seek out a new sales model.

Yang then turned to Baidu Tuiguang, Baidu's pay-per-click management platform, to develop a market presence. However,



like his first start-up business, this was also a disaster. “I spent RMB 2,000 on online ads. It disappeared immediately, without any obvious impact on my business.” Despondent, he arranged to meet Baidu’s customer manager to discuss the issue. It turned out he had set over 100 keywords for his nationwide promotion. However, this was all in vain, as there is no demand for camellia in northern China, where the plant does not grow.

Yang optimized his keywords, reducing the count from over 100 to a dozen, and narrowing down the target market to 14 provinces in southern China that are suitable for growing camellia seedlings produced in Youxian county. It worked very well, as “we immediately began receiving phone calls and requests for consultancy from customers.” After five years, online marketing remains one of Yang’s main strategies for business development. “It accounts for 60 to 70% of our customer base.”

As someone who almost gave up on online marketing as a beginner, Yang’s company is now an industry stalwart thanks to Baidu-Tuiguang, which connects camellia farmers in Youxian county to customers in 14 provinces in southern China. Its cup seedlings in a co-op base brought in revenues of RMB 180,000 to 200,000 per mu in April 2018, with revenue from bare-root seedling sat close to RMB 120,000, and annual revenues expected to exceed RMB20 million. Online orders accounted for over 60% of the firm’s total revenue.

Zhang Tianyi,
a GIS surveyor of Baidu Map

“

Exploring a road inaccessible to others and open it to everyone.

”

“Look at this road,” Zhang Tianyi, a senior GIS surveyor at Baidu Map, says with a sense of accomplishment when he points on the map to a 100 km road between Shanxi and Henan provinces. “I navigated this road myself. When users navigate on Baidu Map, they now have a new option—this road cuts the time taken on other roads by two hours.”

Born in 1993, Zhang has been working as GIS surveyor for two-and-a-half years. An important part of his job is to improve Baidu's digital map, which he does through driving a car collecting street-view data. “My first independent survey was conducted in summer 2016. I drove more than 2,000 km to Gansu province; I had never driven such a long distance before.”

Since then, Zhang has spent most of his time in a car. He drives a retrofitted survey vehicle with panoramic views, which is equipped with high-tech devices for AI functions and data processing, a roof camera capable of shooting 360-degree images, and a PC that has replaced the passenger seat. The trunk is stuffed full of instruments, food, a sleeping bag and a tent...

“The survey car is a mobile home for me; the only time it stays in the parking lot is when it rains or snows,” Zhang explains. On a daily basis,





he drives 150 km a day in the survey car, analyzing roads in cities and the countryside at a speed of 40–80 kph while collecting map data.

On March 31, 2018, Zhang learned that a new road had opened to traffic between the Shanxi and Henan provincial border, which did not appear on any map yet. He decided to explore the new road for users and left Jincheng in Shanxi Province for Jiaozuo in Henan Province that day. He travelled through endless mountains, on one side there was a towering cliff, on the other an unfathomable valley. He drove from first thing in the morning, only stopping when night had descended. “It was impossible to return to Jincheng—the road to Jiaozuo was unknown, and mobile signal was terrible,” says Zhang. But thankfully he spotted a remote home in the shadows of the mountain at the curve of the road.

Zhang parked his car outside the home and knocked the door. He

recalls feeling lucky, as the old couple he met were so kind, offering him a bed and a telephone to use.

By 2017, Zhang had covered 15 provinces, or half of all China's provinces, during his explorations, Zhang says, describing them as extensive self-driving tours.

While Zhang drives a car, some other GIS surveyors ride bikes or just walk. Bike surveys are used for narrow lanes that cars can't travel through, walk surveys are preferred for scenic spots or shopping malls where cycling is not possible. The enormous amounts of data collected via the various survey techniques are gathered and fed into electronic maps, which provide the users with a refined door-to-door navigation service.

“Every step a GIS survey takes, every kilometers of road he drives, every road he travels, every coordinate point he spots are converted into GIS data which are shown on Baidu map that services hundreds of millions of users per day,” Zhang says, using a phrase that is popular among surveyors, “explore road inaccessible to others, and let it serve everyone”.

Luo Yunbo,
former Dean of College of Food
Science & Nutritional Engineering,
China Agricultural University

“

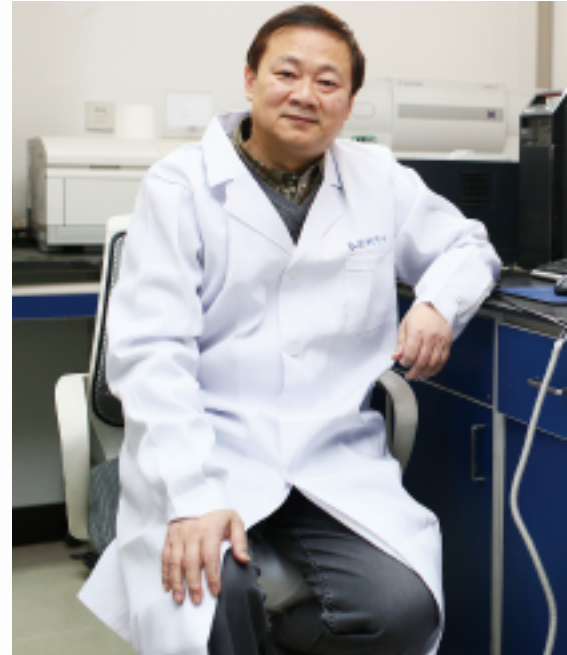
**Speak like ordinary humans rather
than scientists**

”

Luo Yunbo, a top food safety expert in China who is former Dean of the College of Food Science & Nutritional Engineering at China Agricultural University—wears a white gown and flits among test tubes and instruments, reading test reports in his everyday life.

Since 2017, Luo has taken on a new position—as a contributor to Science Education China, Science Encyclopedia Program. It is a science education program jointly founded by the China Association for Science and Technology and Baidu Baike. It was conceived for the editing and authentication of scientific entries from leading scholars in order to digitalize science education resources for the promotion of scientific knowledge. Prof. Luo has created content covering many hot topics in food safety that are now available to the public, who can search and read these entries via Baidu Baike.

“We contributors should be able to highlight food safety issues, and write entries that will provide the public with clarity on them,” says Luo. He points to GMO as an example, saying the public are raising questions on such topics on an ongoing basis. Such issues should be entered in the encyclopaedia, he points out. “The issues



covered in the encyclopaedia are the ones the general public are most concerned about,” he says. “All entries should be explained and analyzed from the outside to the inside, and from the easy to the difficult and complicated. We must deliver explicit information to the public.”

Luo recalls that several years ago, aflatoxins were found in dairy

products, which prompted people to believe that the milk had become poisonous. “The public had no idea what aflatoxins were, so they panicked. In view of this, when writing a Baidu Baike entry on aflatoxins, we should let the public know what the substance is, why it’s dangerous, how many types of aflatoxins there are, and how they can affect the health of humans.” He points out that “people are more likely to be struck by lightning than being poisoned by drinking milk”. He says that by reading this entry, the public should have a scientific understanding of aflatoxins to help alleviate any confusion they may have had on the issue.

Luo explains that the content of the entries should be written in plain language as opposed to containing difficult technical terms. Experts should use the simplest language possible to describe a scientific phenomenon, he adds. As of the moment, Luo has authenticated 257 Baidu Baike entries.

“I am both contributor and a user of Baidu Baike. No one knows everything; every scholar has expertise in a particular field. Some subjects are out with the scope of my knowledge so I need to look them up in Baidu Baike,” says Luo. He goes on to reveal that Baidu Baike’s background system is staffed with numerous leading experts from a variety of fields, who jointly contribute to improve this treasury of knowledge, making it even more authoritative and diversified.

The latest data shows that over 2,800 experts have contributed to Science Education China–Science Encyclopaedia Program, covering fields of natural science such as aerospace, aeronautics, information technology, zoology, and botany, as well as the engineering applications associated with such fields. Currently, over 190,000 authoritative scientific entries have been created.

Tian Yanlan,
a teacher of No. 1 Elementary School,
Shangyou County, Ganzhou City, Jiangxi Province

“

It feels like the top teachers of the nation are giving live classes at our school.

”

“I want my students to live a better life, possess greater knowledge and have a clearer vision than me. But I am worried that I cannot give them the good education that they should have.” These are the words of Tian Yanlan, a teacher at the No. 1 Elementary School in Shangyou County of Ganzhou City, Jiangxi province, even after working as a teacher for 16 years. Though she is one of the best-performing teachers in the county, Tian is still not happy with her efforts. “We lag the teachers in the big cities and our remote location is a distinct disadvantage.”

In 2010, Tian was transferred from a rural elementary school to the No. 1 Elementary School of the county and started teaching the junior grade. “Though I was using computers for teaching purposes, there was no single online teaching platform for me to rely on or use for resources. All I could get from my searches were some online lessons that were difficult to source and not directly related to the course curriculum.” To prepare for the lessons meant Tian had to read teaching reference books, search for relevant information and develop lesson plans, a lengthy and time-consuming process that always keeps her awake until midnight.



In early 2018, she started teaching Grade 4 students as a Chinese language teacher in addition to being the caretaker of the class. “There was greater pressure on me as I was not confident about my teaching abilities and was afraid of teaching misinformation and causing irreparable harms to students,” says Tian. It was during that time that some of my colleagues advised me using Baidu Education Smart Class—Smart Lesson Preparation System, something that has proven to be an irreplaceable educational source even today, she adds.

Tian recalls the days when she first used the Baidu Smart Class tool. Though it was an unfamiliar terrain in the initial days, she has since started using it on a daily basis. After logging into the Smart Lesson Preparation System, she inputs information such as curriculum and grade and immediately gets system recommended information including sample classes, power points, lesson plans, etc.

Tian says that she was initially not that familiar with the G4 textbooks. “I relied on the Famous Teacher’s Recommendation part of the Smart Lesson Preparation System as I believed that the teaching method recognized by the most would have no problems.” Tian says that while preparing lessons, she selected the most downloaded plans from the system, and adjusted the plans in line with her teaching habits and student conditions. Then she used the adjusted plans for her own lectures. It became much easier for her to teach and the teaching results improved drastically.

One of the lessons that impressed Tian was the Chinese language class on Cat, a famous prose written by Lao She. The article describes the cat’s highly diversified miaows. As some students hadn’t carefully listened to the miaows, she followed recommendations from famous teachers’ lesson plans and downloaded a number of audio files of cat miaows and played them to the children. “By listening to the audio, students immediately realized how accurate the author Lao She’s description of a miaow was.”

When explaining to students that cats have a weird temperament, Tian followed recommendations on how to design questions indicated in the lesson plans of famous and experienced teachers. She first asked students to find out which part of essay was about weird temperament of cats, and then let them mimic the author's way of writing to write a story about their favorite animals. "I was excited when reading the students' submissions." She says she was pleased when some of the students made perfect submissions. Using the online knowledge for such submissions not only broadened her teaching perspectives, but also boosted students' interests in writing and Chinese language learning.

After using the Baidu Education Smart Class for a year, Tian feels that it is the best available source of information. The system helps her to emulate famous teachers' lesson plans according to her teaching schedule, enabling her and her colleagues to identify what's important and what's difficult in teaching. "The beautiful slides are ideal gifts for teachers in remote locations. It is as if the top teachers are giving live lectures at our school."

Pei Xiaolong,
a Product Manager at
Baidu Safety Product Center

“

I studied one lesson more than five times, and I still want more.

”

Every day, Pei Xiaolong opens a webpage, and refreshes it once in a while. He is always excited to find new content. Pei is a product manager at the Baidu Safety Product Center and the webpage he refreshes every day is Du Classroom, Baidu's in-house online learning platform. What really excites him are the new courses that are added to the platform on a regular basis.

Since joining Baidu in November 2017, Pei has spent more than 1,180 hours on the platform, or over four hours every day, placing him as a top-learner in terms of the hours Baidu's 40,000 employees spent on the platform.

So how does he find the time to study each day? Pei says he has his own system: "It is actually an issue of time allocation and management, which requires me to set goals and allocate my resources. The first thing I do is develop a weekly plan and schedule, and then I break it down into everyday tasks, mark them by importance, levels of difficulty and duration, and concentrate on the most important tasks that consume more than 50 percent of my time. I spend an additional 30 percent of the



time communicating, thinking and improvising, and the other 20 percent on learning and studying.”

The year-long study course has helped Pei a lot. "On-the-job learning has allowed me to understand our business and strategies intricately, which helps me with my work. Some good examples would be Baidu CEO Robin Li's video presentation on judgment, and the lectures on organisational management by former Baidu CFO Jennifer Li. It is good to know how executives look at business operations from a strategic perspective, offering different perspectives and insights.”

Pei watched a recent lesson more than five times. The presentation was: How to Attend Business Layout and Planning from an Engineer's Point of View?, a course recommended by a colleague from the search department. “It offers insights on how to explore the various needs and requirements and probe businesses via technical approaches, coupled with examples that reflect how to support business layouts and planning from an engineer's perspective. In addition, the series had a chapter on A Thoughtful Story of Machine Learning and Philosophy and Tactics of Big Data Analysis that was also worth watching.”

Aside from lessons on strategic organization, management communication and technology trends, Pei's watch list also includes two more unusual entries: A Deeper Interpretation of Xi Jinping's Thoughts on New Era Socialism with Chinese Characteristics, and The Rise of Manchu and the Founding of the Qing Empire.

Every day, over 6,000 Baidu employees immerse themselves in Du Classroom. Since the launch of the school in 2013, nearly 300 departments have registered on the platform, generating more than 7,000 internally shared courses. Baidu employees have so far accumulated total online and offline learning time of 234 million hours.



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Share your views and advice



Electronic documents

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