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Report Code: GDDT-PL-M102

Patent Statistics and Analysis Q2 2022

A data-driven quarterly report highlighting key trends in the patents landscape compared to the corresponding quarter in previous years

July 2022

Report sections and key findings

1. Regional spotlight

- Q2’22 witnessed a slump in the global patenting activity mainly due to the drop in patent filings and grants from the leading contributor China
- The US witnessed a surge in both filings and grants with its focus on AI, 5G, and industrial automation

2. Movers & shakers

- Asian companies spearhead the patenting activity, Samsung grabs the top spot while Intel emerges as the fastest growing
- Innovation activity of the US startups is on the rise while China's university-lead patent filings growth has slowed down

3. Top patented technologies

- Artificial intelligence has garnered the highest traction in patent filings followed by 5G
- Computer technology has observed a significant growth in neural networks, image data processing, and video recognition technologies

4. Top patented sectors

- The retail sector patent filings grew at the highest annual growth rate of 13% with an emphasis on digitalization
- The financial services sector patent filings grew by 4% primarily owing to inventions in digital banking, digital payments, and insurtech areas

5. Licensing & litigation trends

- The licensing deal between Huawei and Nordic Semiconductor has caught media attention
- Fintiv, Apple, Paypal, and Walmart were abuzz in the news for infringement litigations

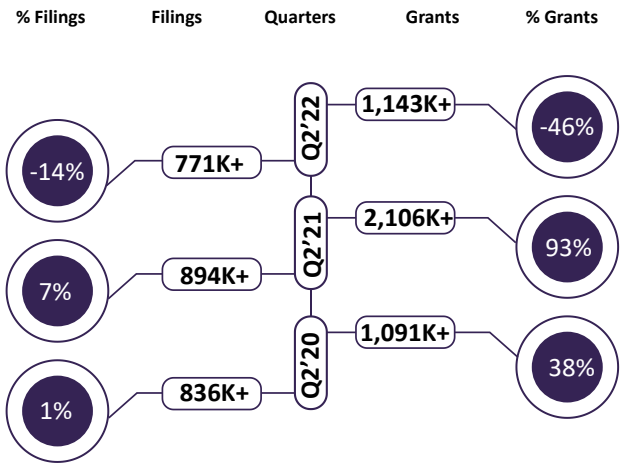
6. Social media & trend analysis

- New Zealand’s tech company Soul Machine announces an advanced version of its humanized AI platform
- Hyundai’s and Ford’s crabwalk mode and Eko Device’s AI stethoscope hit the headlines

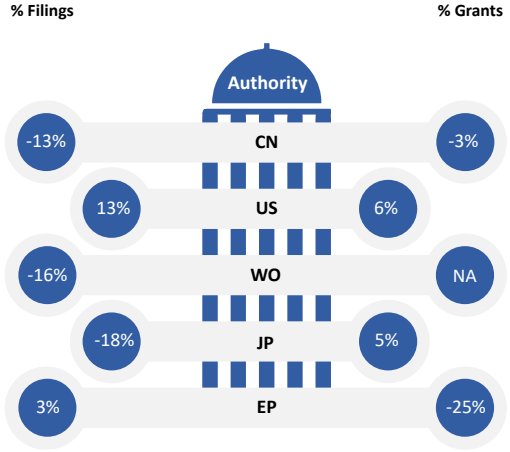
Analytical summary

- Q2’22 observed a decline in both the filings and grants, primarily attributed to the decrease in the patent filings of CN which has been the top contributor for many years.
- Intel has recorded the highest 42% YoY in Q2’22* patent filings mainly in cybersecurity, artificial intelligence (AI), and digitalization.
- Patenting activity in AI has grown by an AAGR of 25% and is anticipated to continue for the rest of 2022.

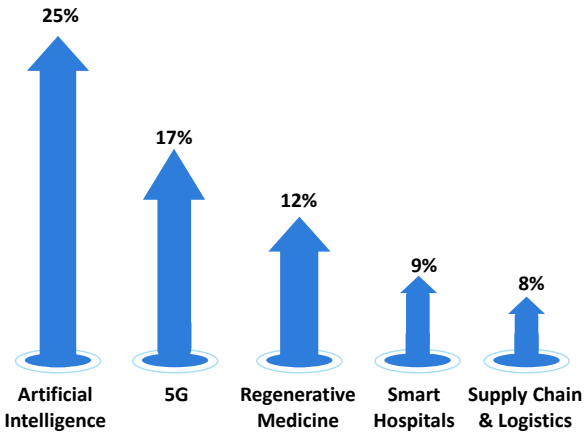
Filing/Grant Trends



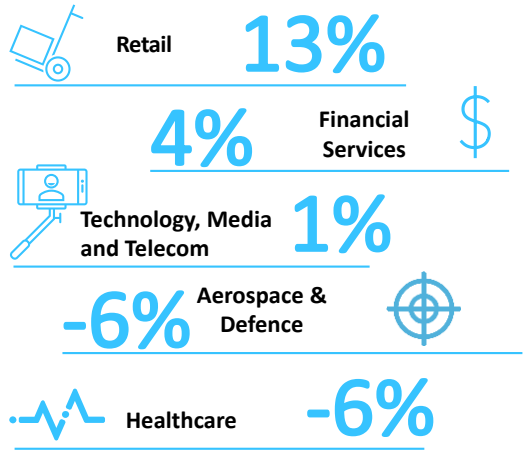
Top Authorities (YoY in Q2)



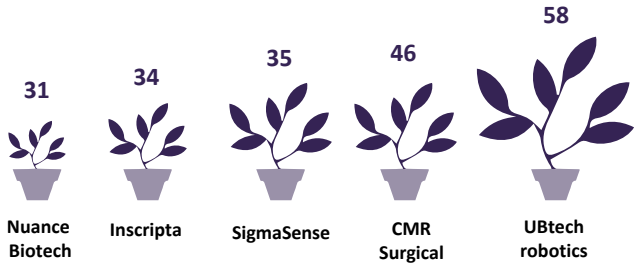
Top Themes (AAGR)



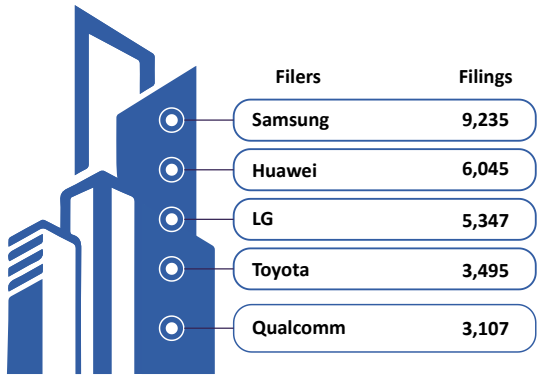
Top Sectors (AAGR)



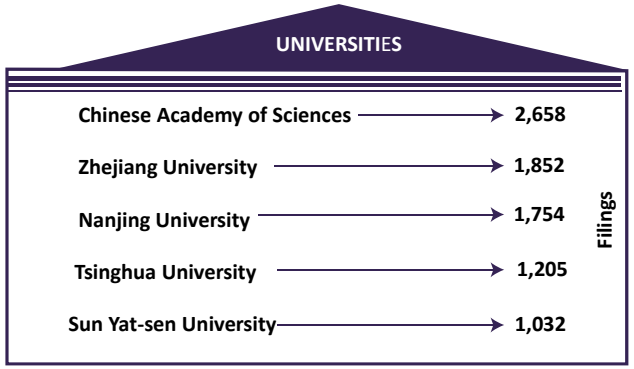
Top Startups



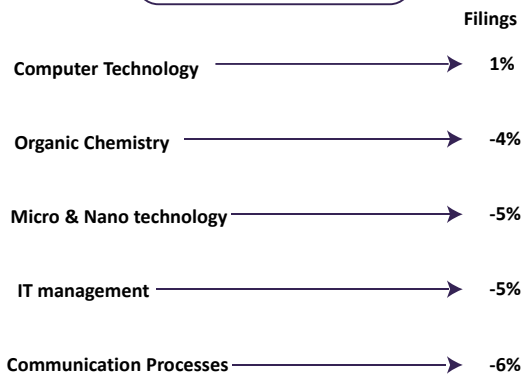
Top Corporations



Top Universities



Top Technologies (YoY in Q2)



Source: GlobalData Patent Analytics

Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate.

*The comparison is between Q2'22 and Q2'21 across the report unless specified otherwise.

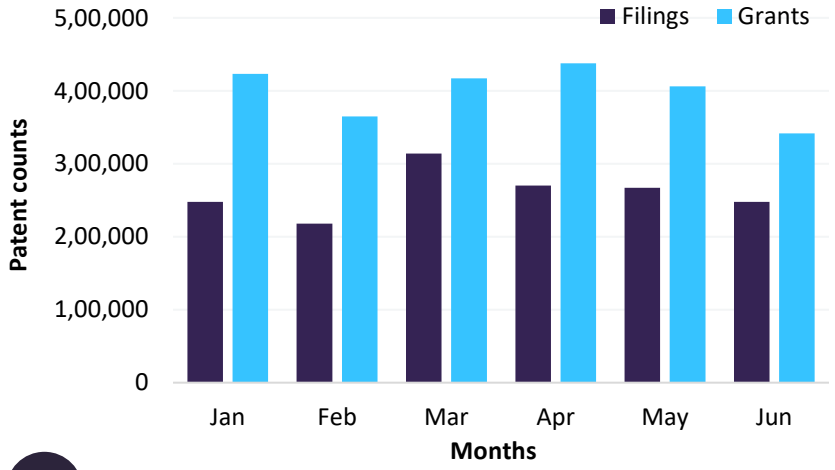
Comparison between Q1’22 and Q2’22

Q1’22 Vs Q2’22

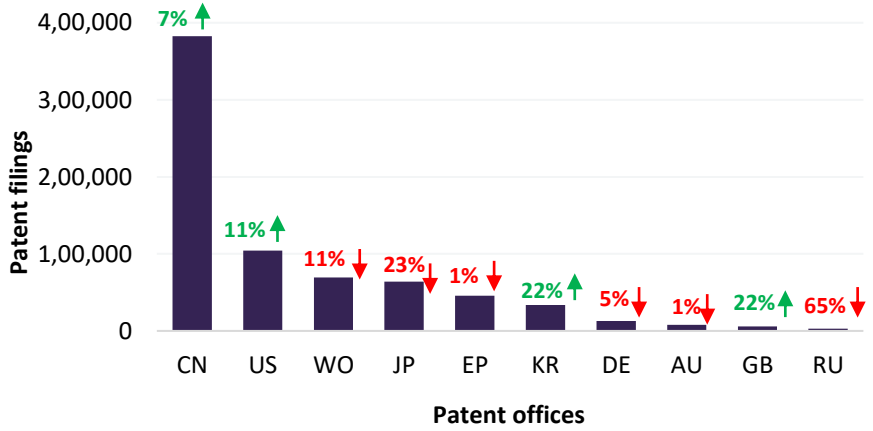
- Compared to Q1’22, there was a 1% increase in patent filings, while a 2% decrease in patent grants in Q2’22.
- In addition to China, the US, South Korea, and the UK have seen an increase in their filings. Russia recorded a downturn possibly due to the Russia-Ukraine war.
- Power & utilities, the sector with the largest contribution in the first quarter, experienced a dramatic drop in its ranking in the second quarter. Automobile, however, remained dominant in both quarters.
- AI continued to grow at an unprecedently rate in both quarters, 25% in Q2’22 and 27% in Q1’22.
- Regenerative medicine, smart hospitals, supply chains, e-commerce, and health technology are among the top 10 themes in Q2’22.

Q2’22 patent filings grew by 1%, primarily attributable to the growth in AI and 5G

1 Patent filings and grants: Q1’22-Q2’22



2 Top patent offices with patent filings: Q1’22-Q2’22



3 Top sectors: Q1’22-Q2’22

Q1’22 Rank		Q2’22 Rank	Q1’22 Rank		Q2’22 Rank
↓ 1	Power & Utilities	↓ 5	↓ 6	Automotive	↓ 7
↑ 2	Retail	↑ 1	↑ 7	Healthcare	↑ 4
↑ 3	Financial Services	↑ 2	↑ 8	Aerospace & Defence	↑ 6
↑ 4	TMT	↑ 3	— 9	Packaging	— 9
↓ 5	Construction	↓ 8	↑ 10	Oil & Gas	— 10

4 Top themes: Q1’22- Q2’22

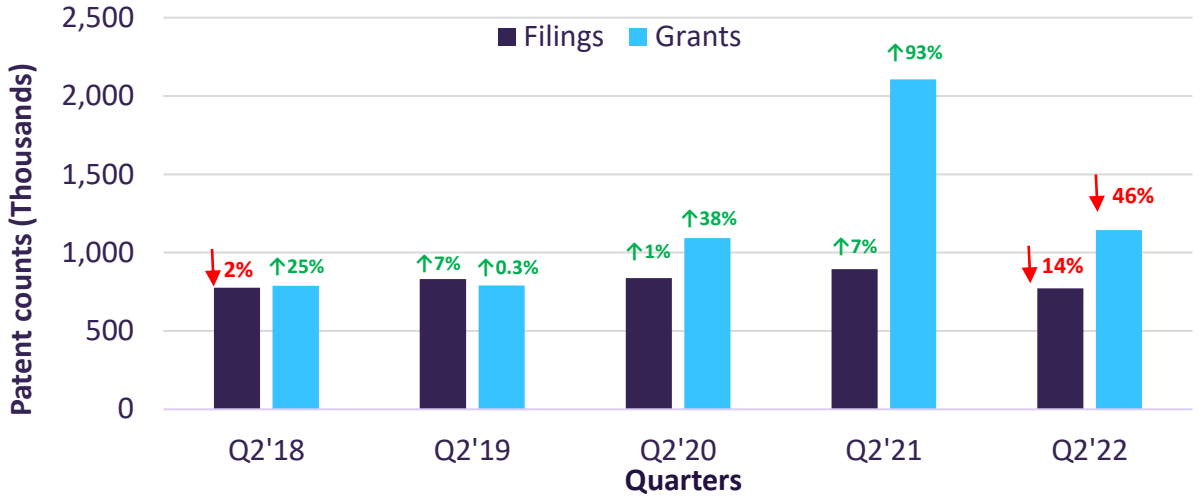
Q1’22 Rank		Q2’22 Rank	Q1’22 Rank		Q2’22 Rank
— 1	Artificial Intelligence	— 1	↓ 6	Digitalization	↓ 3
↑ 2	5G	10+ ↑	↓ 7	Fintech	↓ 2
↑ 3	Regenerative Medicine	10+ ↑	↓ 8	Cybersecurity	↓ 4
↑ 4	Smart Hospitals	10+ ↑	↑ 9	Ecommerce	10+ ↑
↑ 5	Supply Chain & Logistic	10+ ↑	↑ 10	Healthtech	10+ ↑

Regional spotlight

Despite a dip in global patenting activity in Q2'22, the US has experienced a growth of 13% in filings and 6% in grants

Number of patent filings and grants by quarters: Q2'18-Q2'22

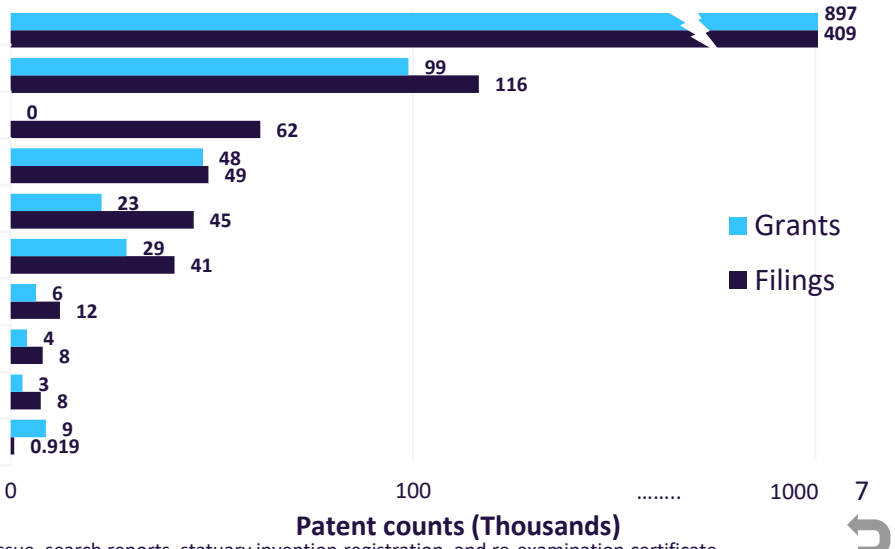
- Q2'22 observed a decline in both the filings and grants, primarily attributed to the decrease in the patent filings of CN which has been the top contributor for many years.
- China's utility model has decreased by 2% in Q2'22 compared to Q2'21 as a result of the enhanced scrutiny during the official evaluation stage. The decrease is reflected in the country's overall decline in grants.
- The major contribution in Q2'22 patent filings came from the US, EP, and GB, predominantly in AI, 5G, and industrial automation themes.



YoY growth in the number of patent filings and grants in top patent offices: Q2'21-Q2'22

- The Chinese government is making a determined effort to put the focus back on patent quality rather than quantity by reforming China's patent incentive structures. One such is eliminating all the existing patent subsidies, which possibly is leading to the country's decreased patent activity.
- Despite the increase of 4% in the patent filing fees by the European Patent Office (EPO) from April 1, 2022, the filings continue to grow in EP.
- The South Korean Patent Office has significantly amended the Korean Patent Act (KPA) for the benefit of patent applicants. However, South Korea has seen a sharp decline in both patent filings and grants, which is anticipated to rise in the coming quarters.

Patent Offices	Growth in filings	Growth in grants
CN	13% ↓	3% ↓
US	13% ↑	6% ↑
WO	16% ↓	NA
JP	18% ↓	5% ↑
EP	3% ↑	25% ↓
KR	12% ↓	22% ↓
DE	22% ↓	14% ↓
AU	6% ↓	43% ↓
GB	0.3% ↑	11% ↑
ES	2 9% ↓	3%↓



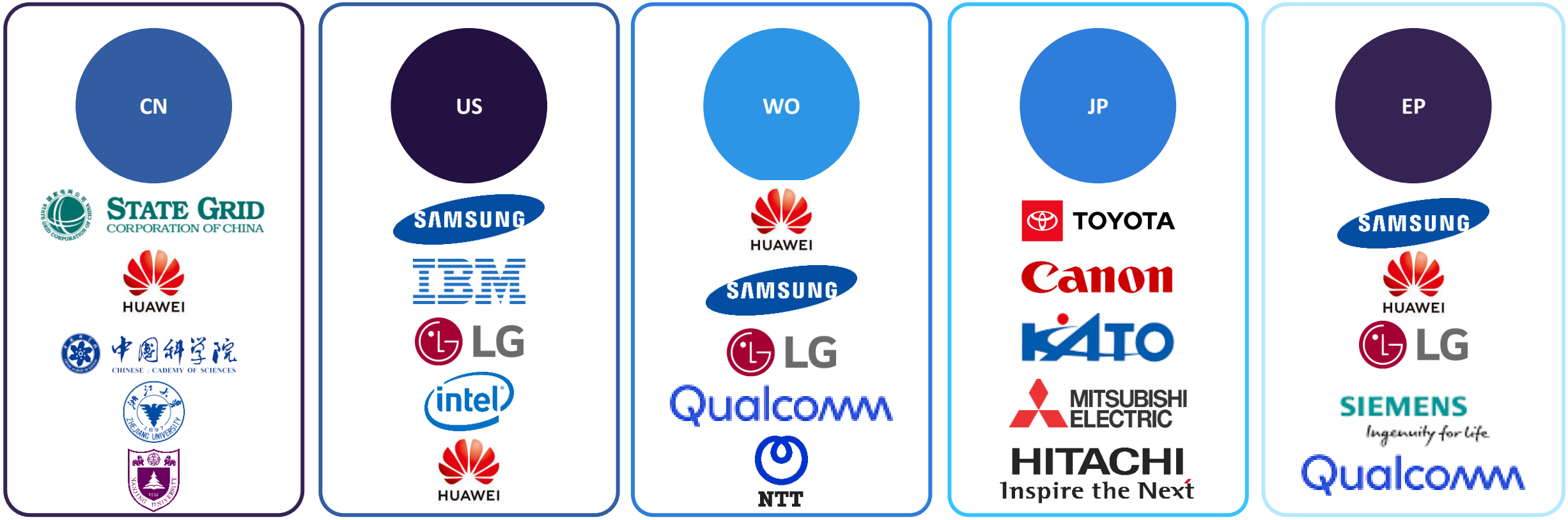
Source: GlobalData Patent Analytics

Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate.

Huawei has been patenting aggressively in China, the US, WIPO, and Europe

- The top assignee in CN and JP patent offices are dominated by domestic filers. Chinese Academy of Sciences, Zhejiang University, and Nanjing University are among China's top five filers.
- US patent office has most of the patent filings from Asian corporate giants such as Samsung, LG, and Huawei, while IBM and Intel are the only US-based filers competing with them.
- Huawei is the sole filer with a presence in all four of the top patent offices where it dominates the WIPO.

Top five assignees in each patent offices by total filings: Q2'22



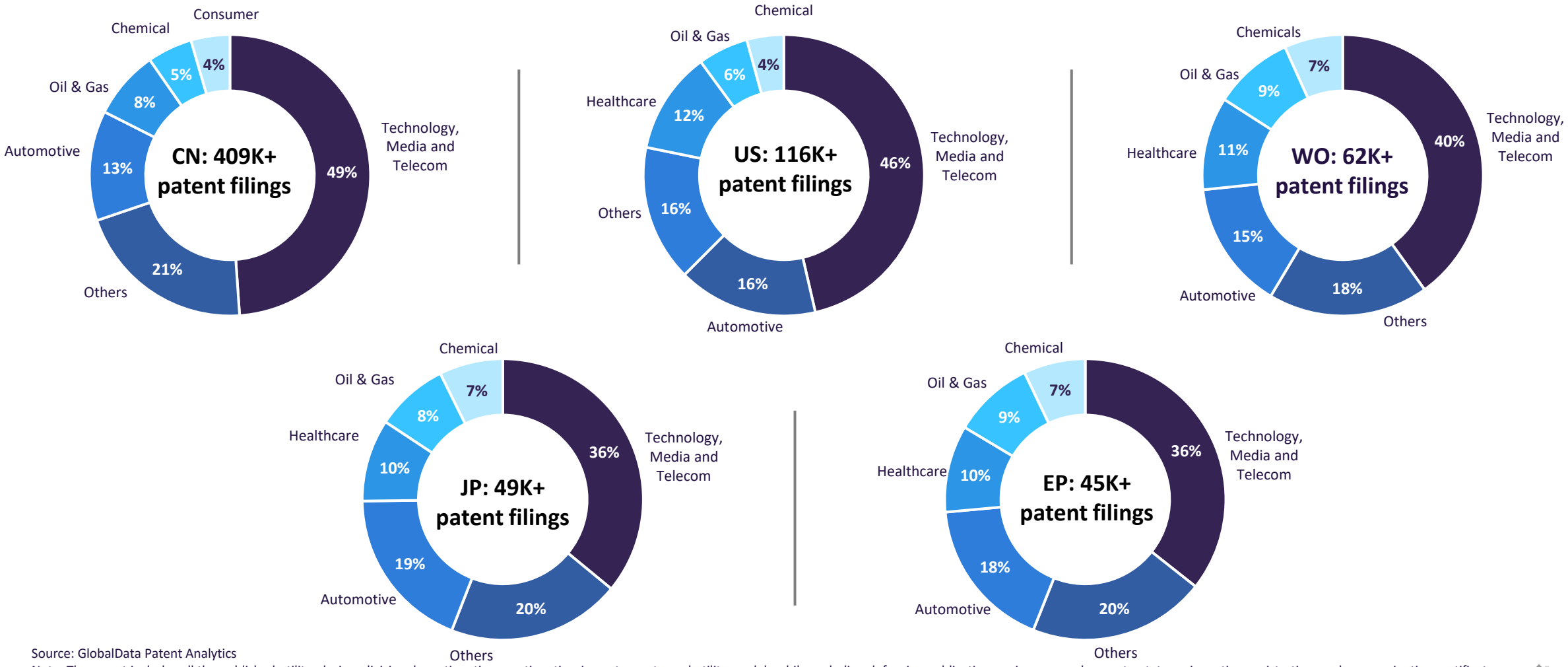
Source: GlobalData Patent Analytics
Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate.

TMT technologies dominate patent filings across top patent offices…

…automotive clinched the second place

- Unlike other patent offices, China's patent filings for healthcare are trailing. TMT accounts for 49% of its patent filings.

Sectorial distribution of top five patent offices of Q2'22:



Source: GlobalData Patent Analytics

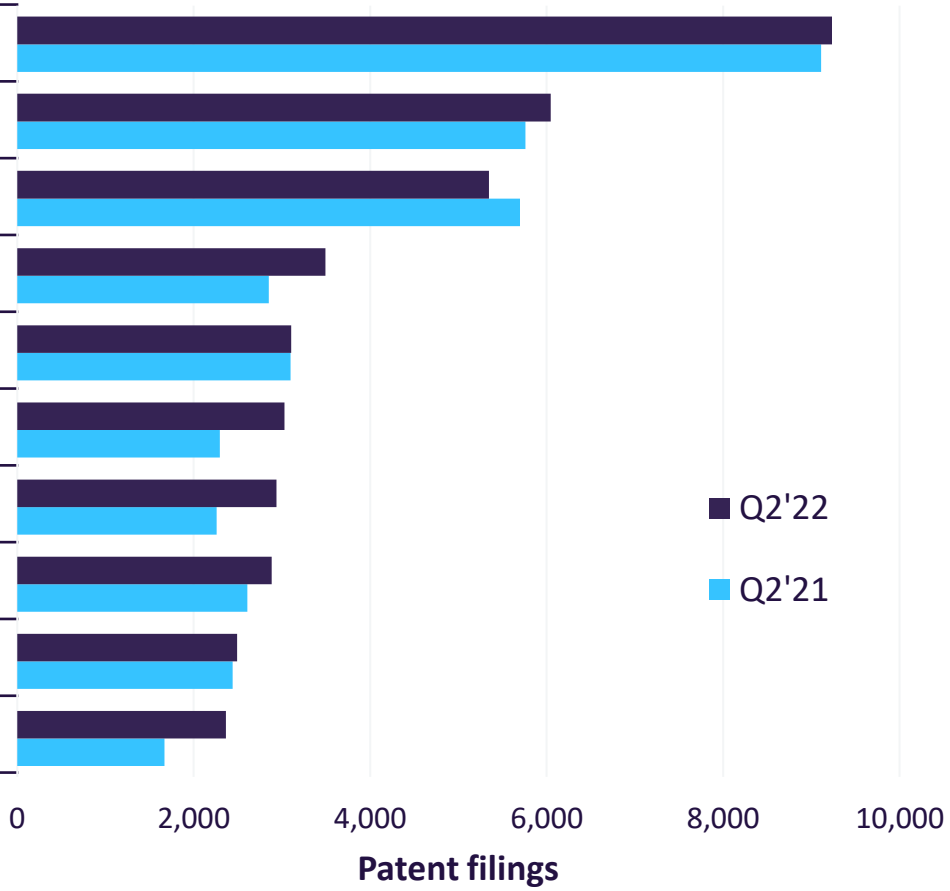
Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate. TMT is the technology, media, and telecom sector.

Movers & shakers

Asian companies dominate in Q2’22, Samsung at No. 1 and Intel fastest growing

YoY growth in patent filings by top ten corporate assignees: Q2’21-Q2’22

Assignee	Head-quarters	Growth Rate
SAMSUNG	South Korea	↑ 1%
HUAWEI	China	↑ 5%
LG	South Korea	↓ 6%
TOYOTA	Japan	↑23%
Qualcomm	US	↑0.3%
SINOPEC	China	↑32%
BOSCH	Germany	↑30%
Canon	Japan	↑11%
HYUNDAI	South Korea	↑ 2%
intel	US	↑42%



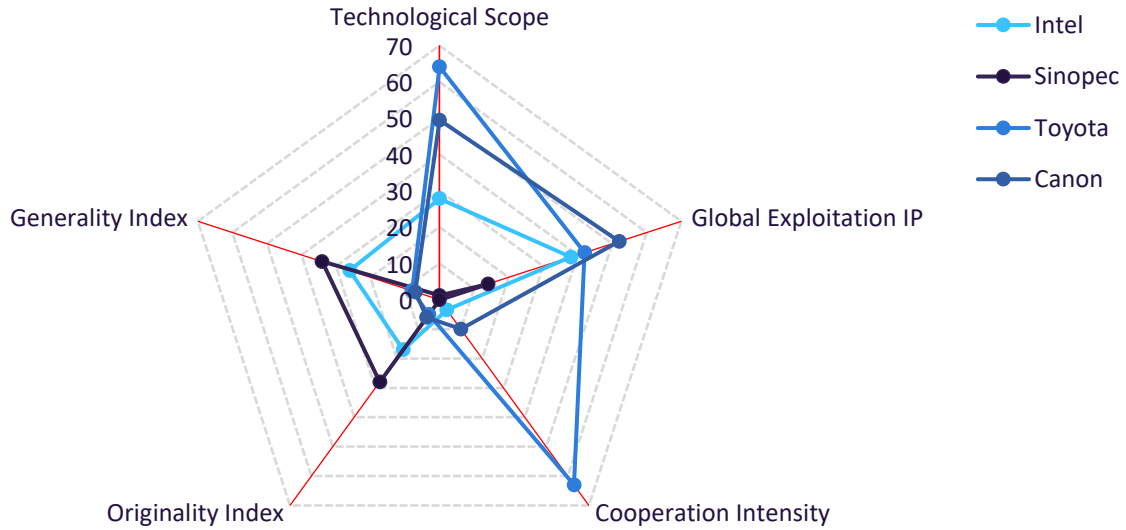
- According to the latest World Bank report*, the global economy has slowed down due to the recovery from the COVID-19 pandemic damages. As a result, companies might face tough decisions about applying for patents and payment of maintenance fees. This is reflected in the slow-down of filing from many companies such as Samsung, Huawei, LG, and Qualcomm.
- According to the Intellectual Property Owners Association (IPO), Toyota obtained more patents from the USPTO than any other automaker in 2021, and it has continued to be a prominent filer in Q2’22 contributing 26% of patents in the US.
- Intel has witnessed the highest 42% YoY growth in Q2’22 patent filings mainly in cybersecurity, AI, and digitalization.

Source: GlobalData Patent Analytics
Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate.
*The insight is based on World Bank’s Global Economic Prospects report released on June 7, 2022.

Toyota witnessed the highest technological scope and co-operation intensity

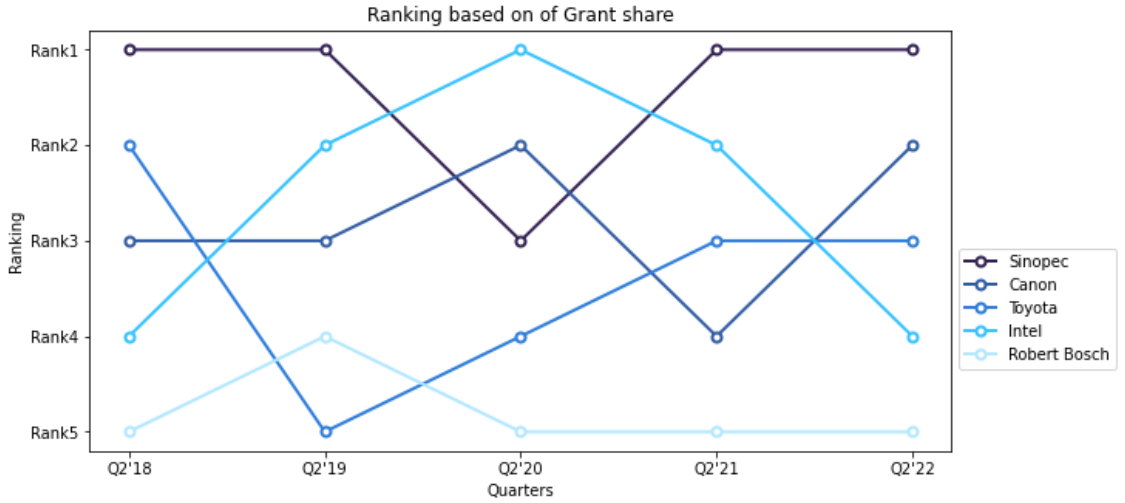
Point-in-time (PIT) indicators for the top four growing assignees of Q2’22:

- Toyota has the highest value of **technological scope** indicating it has diverse inventions in its patent portfolio. While its highest **co-operation intensity** indicates that it is collaborating with different companies and universities for new inventions.
- Based on **global exploitation IP** value, GlobalData observes that Sinopec’s patenting activity is predominantly confined to China.
- Sinopec’s **originality index** value highlights its diverse research in innovation areas and its **generality index** reflects its valuable patents based on forward citations.



Ranking of top five growing assignees of Q2’22 by grant share: Q2’18-Q2’22

- The ranking of the top five assignees is based on the grant share in Q2 for the last five years.
- Sinopec takes the top seat in Q2’18 and continues to be at the top in Q2’22 with most of its granted patents from the China patent office where 37% of its patents account for the utility model.
- Toyota has jumped up its position from third to second with most of its patents granted in Japan, the US, and China patent offices.

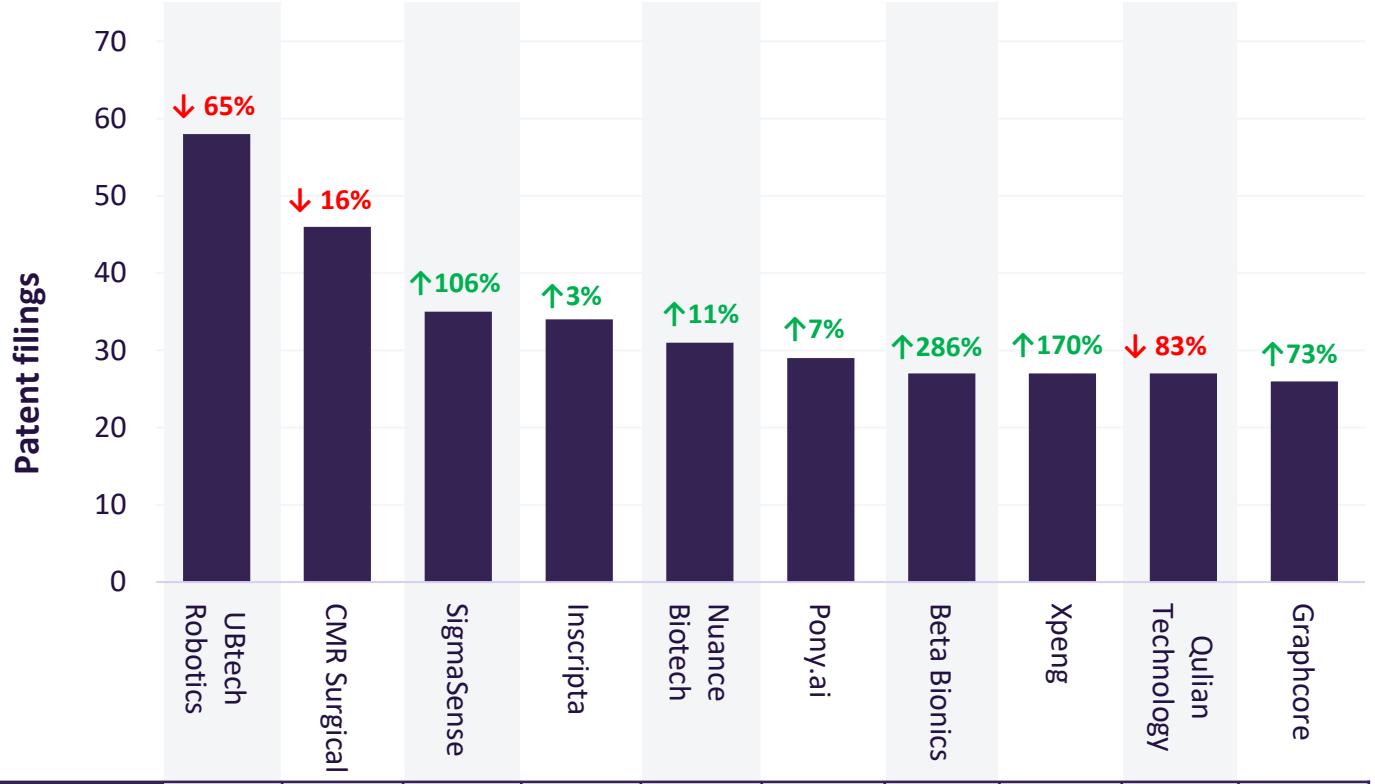


Source: GlobalData Patent Analytics

Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate. The PIT parameter is defined in the glossary. For the Radar chart, the values are converted into a 0-100 percent scale. The PIT data is for the patents covering the date range of the last 20 years.

US startups are progressing, Beta Bionics sees the highest growth

YoY growth in patent filings by top ten startups with their headquarters and funding: Q2’21-Q2’22



HQ	China	UK	US	US	China	UK	US	China	China	UK
Total Funding (M)	$940	$991	$51	$437	$209	$1,095	$189	$5,700	$234	$682

- Patents enable startups to raise funds and help in building new products. In Q2'22, China, the US, and UK-based startups were the top contributors to patent filings.
- China-based startup UBtech Robotics filed the highest patents in Q2’22 mainly in programmed-controlled manipulators, biological models, and portable power-driven tools.
- America Invents Act’s (AIA), Patent Pro Bono Program has helped startups in the filings process with free legal advice, resulting in smooth patenting activity. The program’s benefits were evident from the growth observed by US-based startups in Q2’22.
- Beta-Bionics, a US-based medical device startup, witnessed the highest growth of 286% with most of its patents on artificial pancreas, automated blood glucose monitoring systems, and multi-medicament infusion systems.

Source: GlobalData Patent Analytics
Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate.*The total funding indicates the total funds raised during various deals since the incorporation of the startup. The list of startups are identified using GlobalData’s companies database.

Startup Spotlight – Beta Bionics (Medical Equipment)

Beta Bionics's overall rank in GlobalData's Startup Scorecard jumped from 1,798 (as per July 2021 version) to 521 in the latest version of the scorecard (April 2022) driven by a jump in its investment activity rank by 1,019 and its innovation rank by 1,918.

- Beta Bionics is a clinical-stage medical technology company focused on the design, development, and commercialization of its iLet Bionic pancreas system. Beta Bionics provides a turn-key automated blood glucose control system for children and adults with type 1 diabetes.

- GlobalData's startup scorecard reveals that Beta Bionics is a key startup in the medical equipment sector which is ranked 23rd within the sector and secures an overall rank of 521 among 20,000 startups.

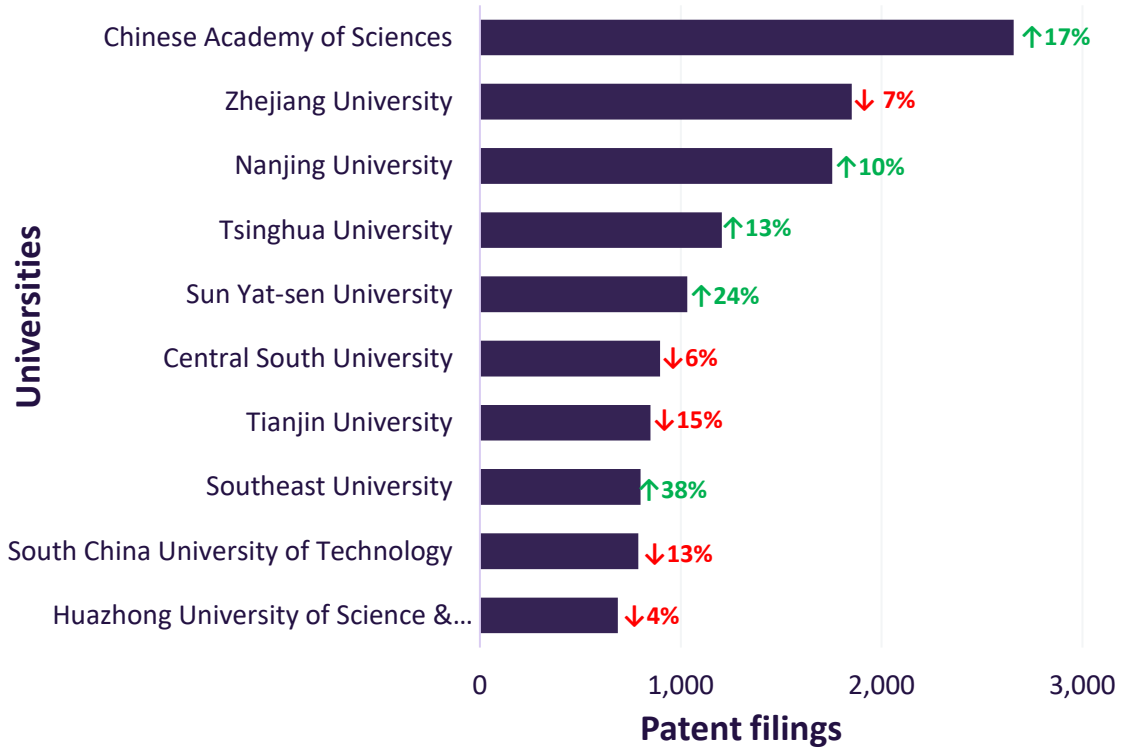
- Investor activity rank jumped from 1,508 to 489 (from July 2021 to April 2022) driving the jump in its overall rank by 1,019.
- This is driven by the startup's $57 million in series C funding in February 2022, led by Eventide and Farallon Capital Management.
- The startup has raised a total of $193.5 million so far in seven rounds of venture financing and funding.

- The patent portfolio of the startup consists of 43 filings and 17 grants.
- The startup applied for 31 patents between April 2022 and July 2022.
- The startup's patenting focus is on health tech and remote patient monitoring.

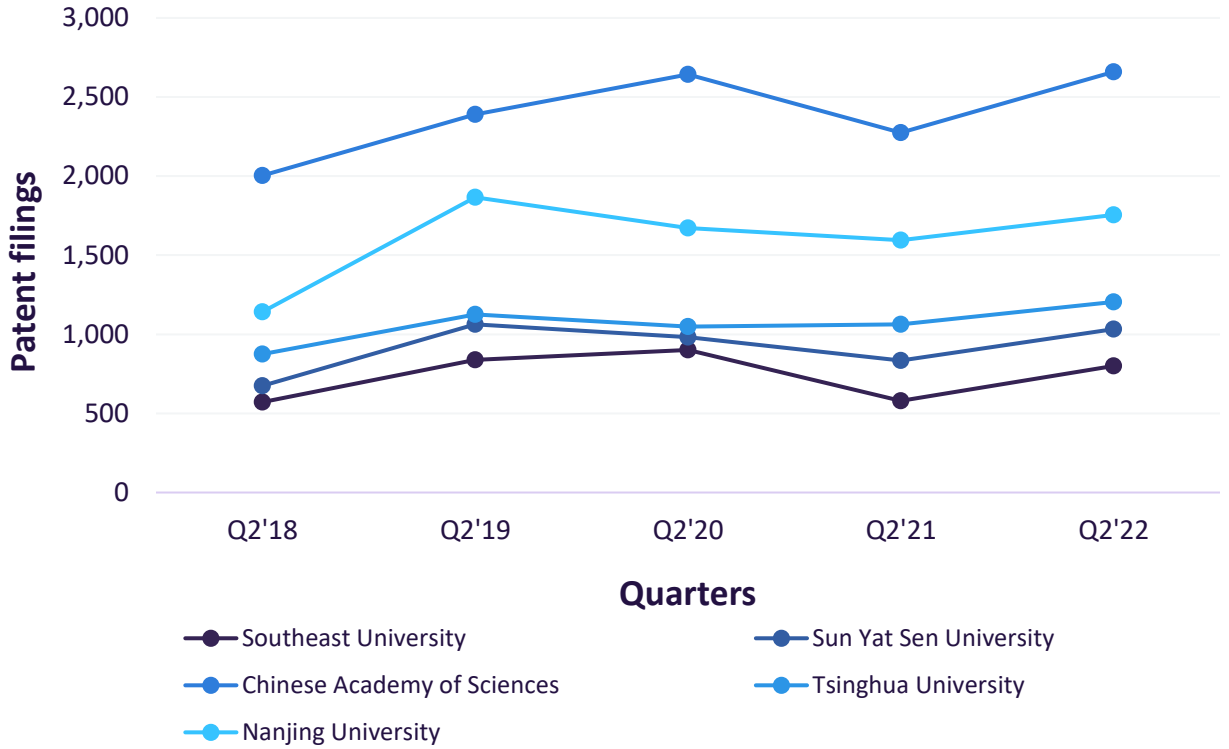
Source: GlobalData Disruptor

Chinese universities take the lion’s share of the filings by academia

YoY growth in patent filings by top ten academia: Q2’21-Q2’22



Patent filing trends of top five academia by YoY growth: Q2’18-Q2’22



- Most Chinese universities have registered negative growth which may be due to the elimination of patent subsidies by the Chinese government.
- Chinese Academy of Sciences, Zhejiang University, and Nanjing University were among China's top five filers.
- Chinese Academy of Science filed the highest number of patents in Q2’22 with a growth of 17% focusing on greenhouse gas emissions mitigation, image processing, and genetic engineering.
- The highest growth of 38% in Q2’22 was from Southeast University, with most of its patents around health informatics, infrared-based material characterization, and satellite positioning systems.
- Sun Yat-sen University has shown the highest growth of 24% mostly in the innovation related to health tech, primarily in medicinal preparations, genetic engineering, and antineoplastic medicines.

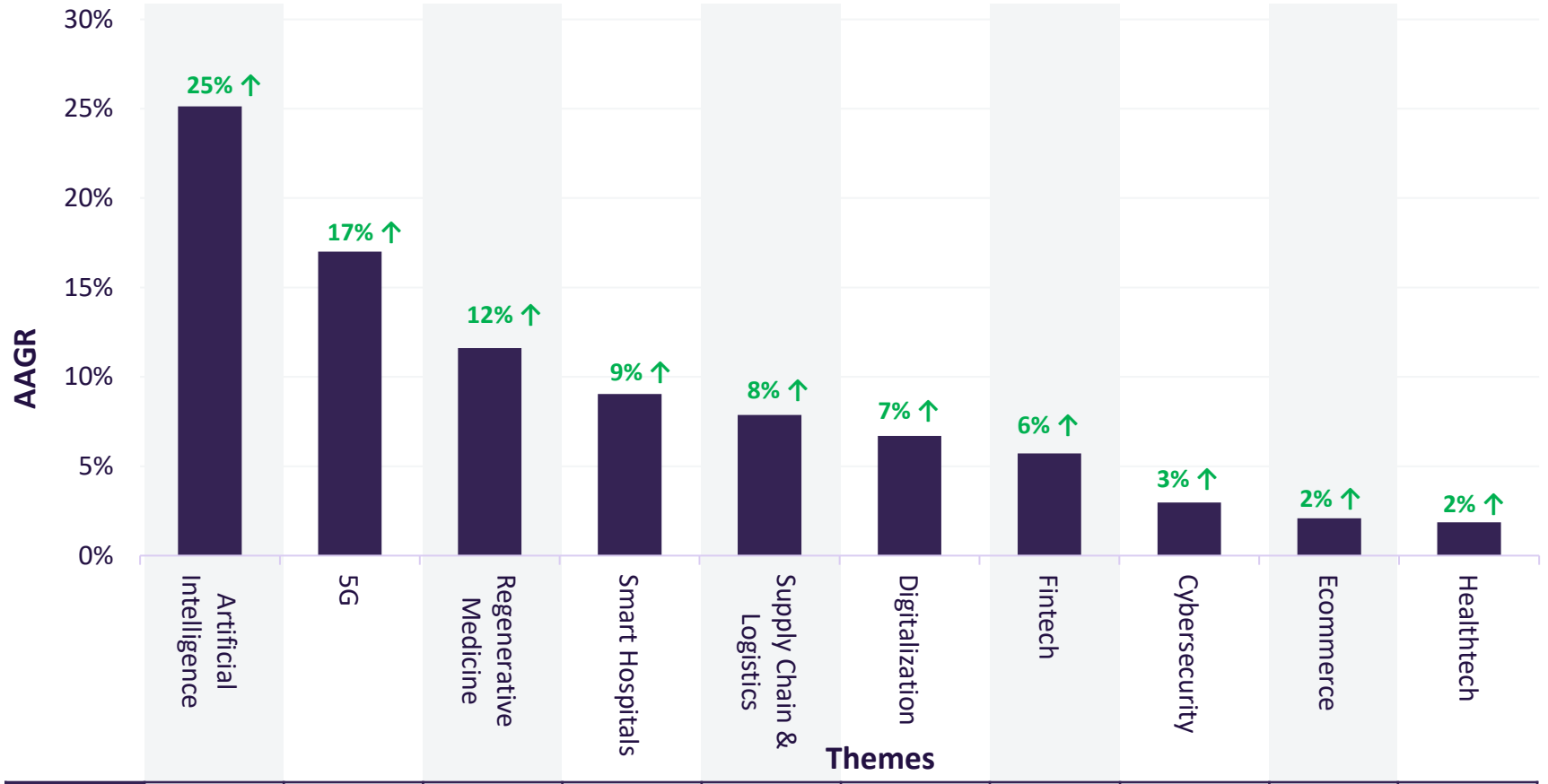
Source: GlobalData Patent Analytics

Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate.

Top patented technologies

Surge in AI patenting activity is expected to continue in 2022

Top ten themes based on AAGR: Q2’18-Q2’22



	Artificial Intelligence	5G	Regenerative Medicine	Smart Hospitals	Supply Chain & Logistics	Digitalization	Fintech	Cybersecurity	Ecommerce	Healthtech
Q2’22 filings	19,997	2,714	2,096	2,644	3,235	36,397	7,211	14,388	8,634	18,324

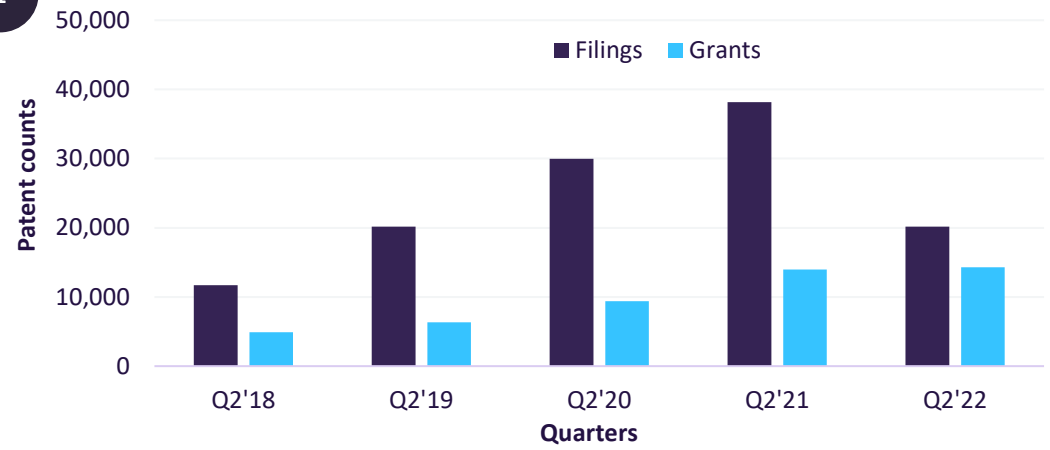
- AI has registered the highest growth of 25% due to an increase in its adoption in almost every industry from driver assistance in automotive to risk planning in oil & gas.
- 5G’s growth is promoted by the internet of things (IoT), connected cars, automated homes, cybersecurity, and smart cities among others. China owns nearly 55% of the 5G technology patents, staying at the top of the patent offices, where Huawei and Samsung lead the race.
- Most of the regenerative medicine patents were filed in the US and EP and focus on stem cells, gene therapy, tissue engineering, and bioprinting. Interestingly most of its filings were from universities such as the University of California, Stanford University, and Harvard University.
- Smart hospital technology witnessed a growth of 9% which can be attributed to the surge in telehealth usage during the COVID-19 pandemic as the most sought-after way to safely access and deliver healthcare. Most of its patents were from the US where Johnson & Johnson, Philips, and Medtronic lead the race.

Source: GlobalData Patent Analytics
Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate.
AAGR is the annual average growth rate which is calculated for all the Q2 quarters of the last five years (2018-2022).

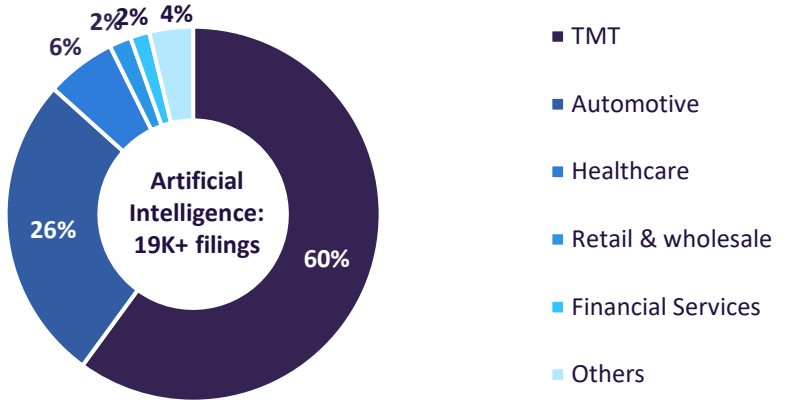
The US is the world leader in AI with China trailing

- IBM stood as the leader in AI patent filings with a focus on biological models, image analysis, and speech recognition.
- Most of the Q2’22 AI patents were filed in the US followed by CN and WO.

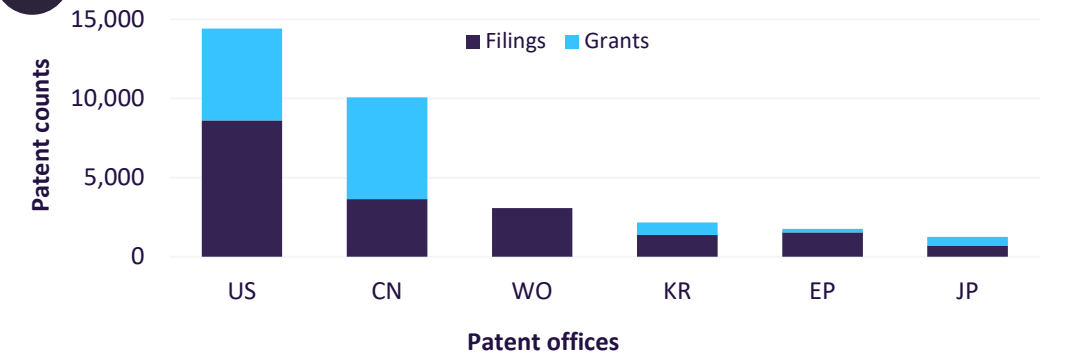
1 Patent filings and grants in AI for quarters: Q2’18-Q2’22



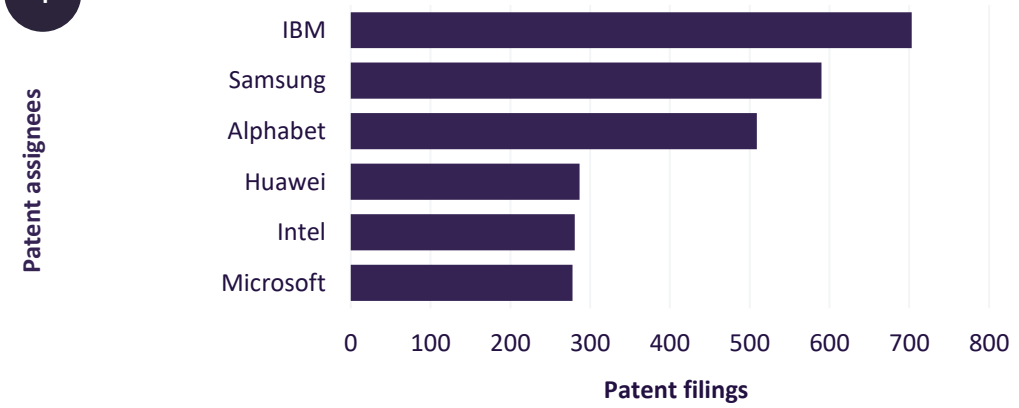
2 Patent filings of top five sectors in AI: Q2’22



3 Patent filings and grants in AI by patent offices: Q2’22



4 Patent filings in AI by top assignees: Q2’22



Source: GlobalData Patent Analytics

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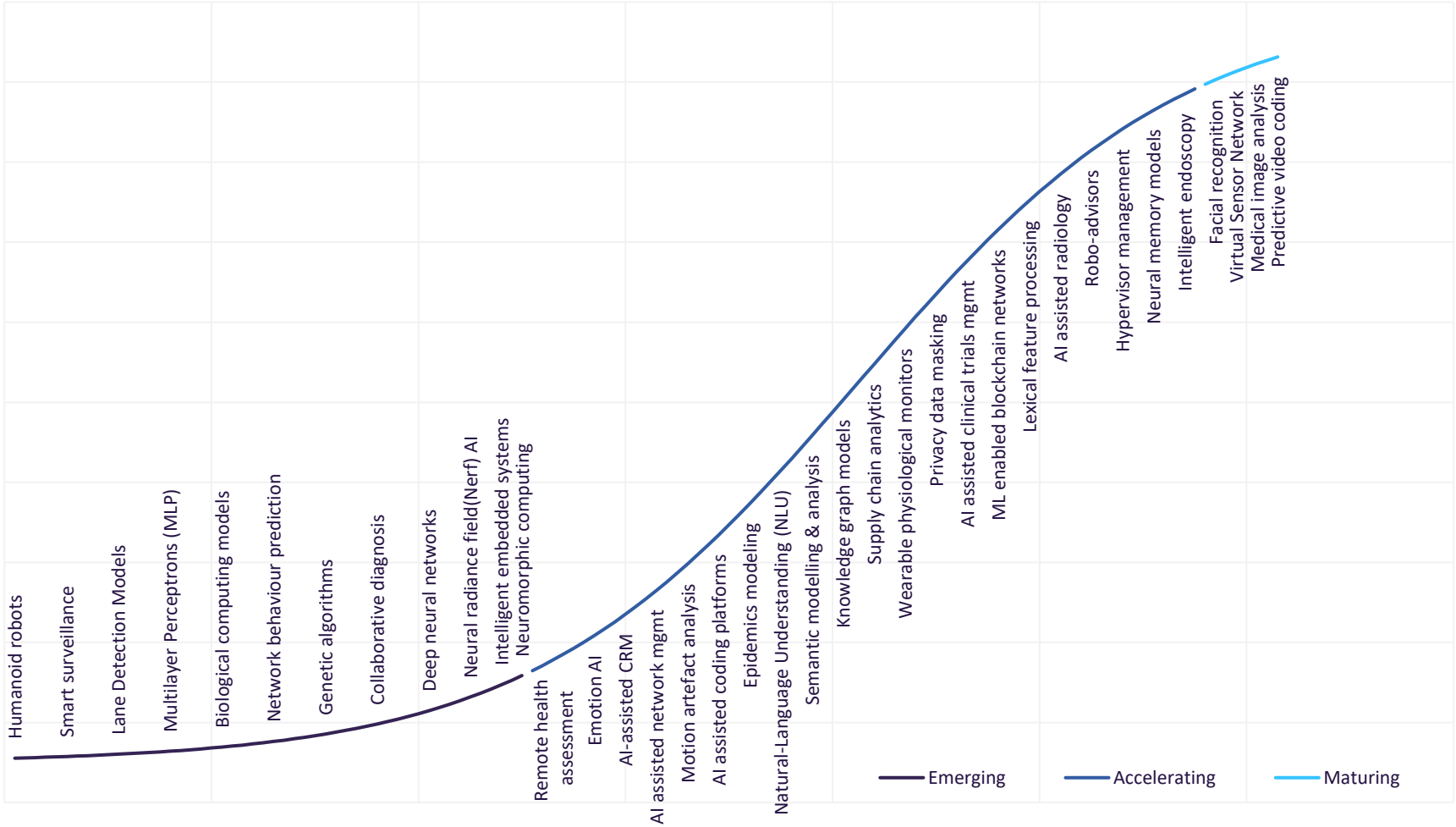
GlobalData’s Technology Foresights Model highlights the emerging, accelerating, and maturing innovation areas with disruptive potential in AI

S-curve for AI with its key innovation areas as emerging, accelerating and maturing: 2018-2021

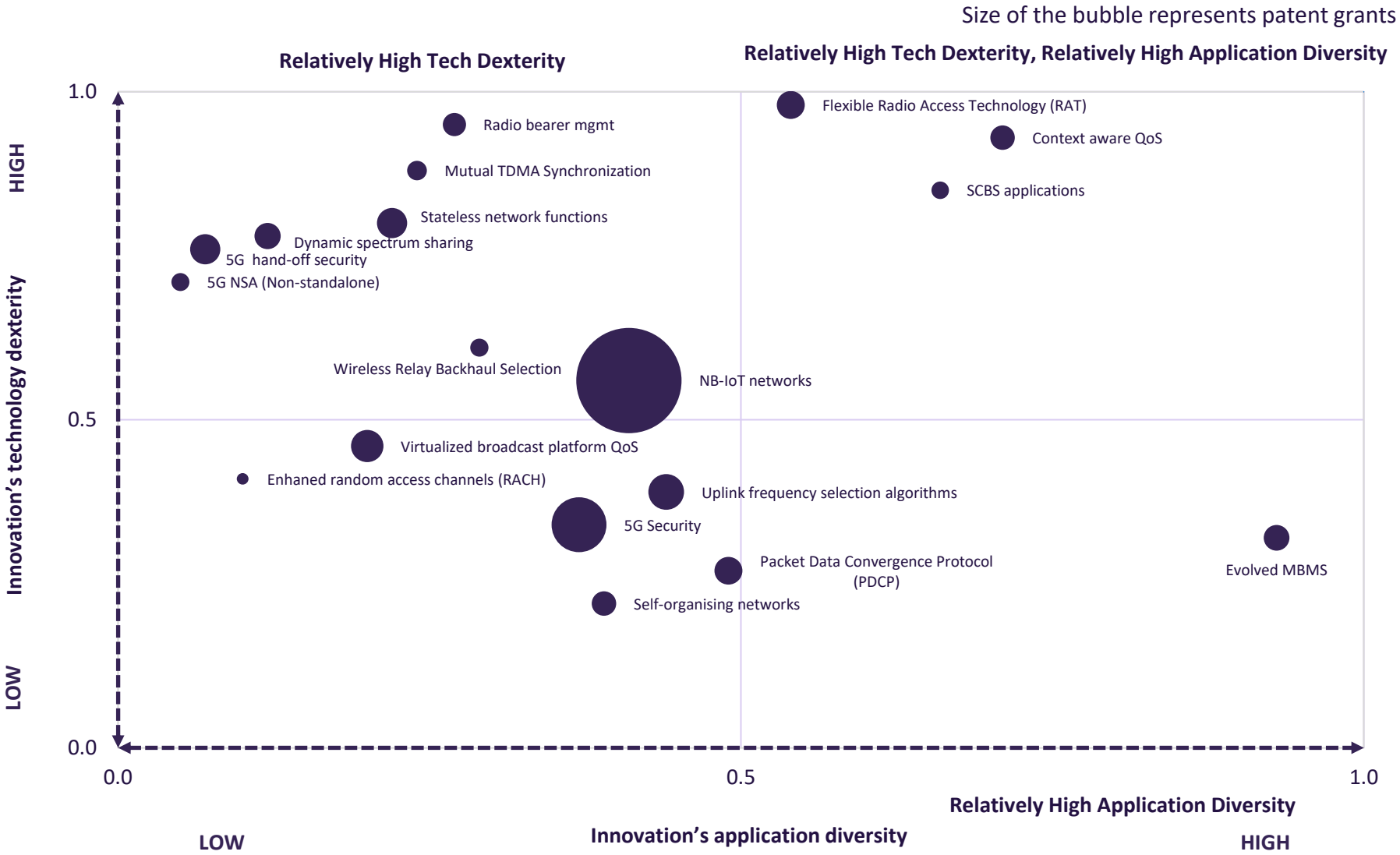


- GlobalData’s Technology Foresights empowers clients to stay ahead by decoding tech-led disruptions of the future along with insights on key players, their disruptive potential, sectoral impacts, adoption trends, and real-world applications.
- The Technology Foresights model predicted humanoid robots, genetic algorithms, and intelligent embedded systems, among others as emerging technologies.
- Remote health assessment, emotion AI, and AI-assisted clinic trials, among others are the accelerating areas in AI.

Source: GlobalData Technology Foresights

Key innovation areas within a wireless network in 5G which are likely disruptive

Quadrant analysis for key disruptive areas of wireless network in 5G: 2018-2021



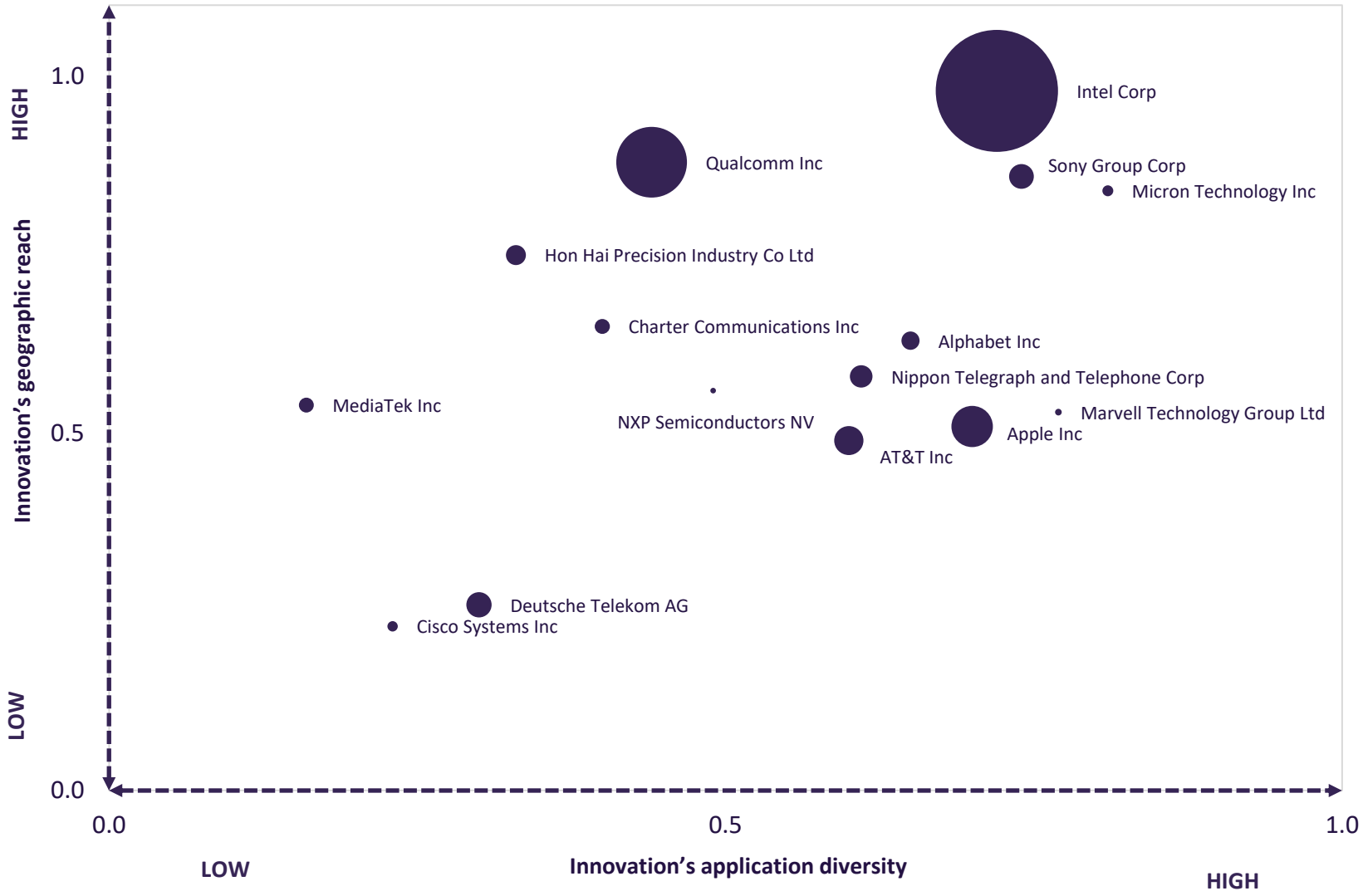
- GlobalData's Technology Foresights highlights the quadrant analysis which identifies the key disruptive areas in the wireless network in 5G.
- The parameter tech dexterity indicates the technical depth of innovations while application diversity measures the potential applicability in different products and solutions.
- The analysis is done using the total patent grants from 2018 to 2021 for the technologies listed.
- Wireless-related technologies such as flexible radio access technology, context-aware QoS, and small cell base stations (SCBS) applications are among the key disruptive areas with high-tech dexterity and application diversity.

Source: GlobalData Technology Foresights

Intel is proving its way in NB-IoT for fast-growing 5G wireless technology

Companies innovating in the NB-IoT networks which are likely disruptive in nature: 2018-2021

Size of the bubble represents patent grants

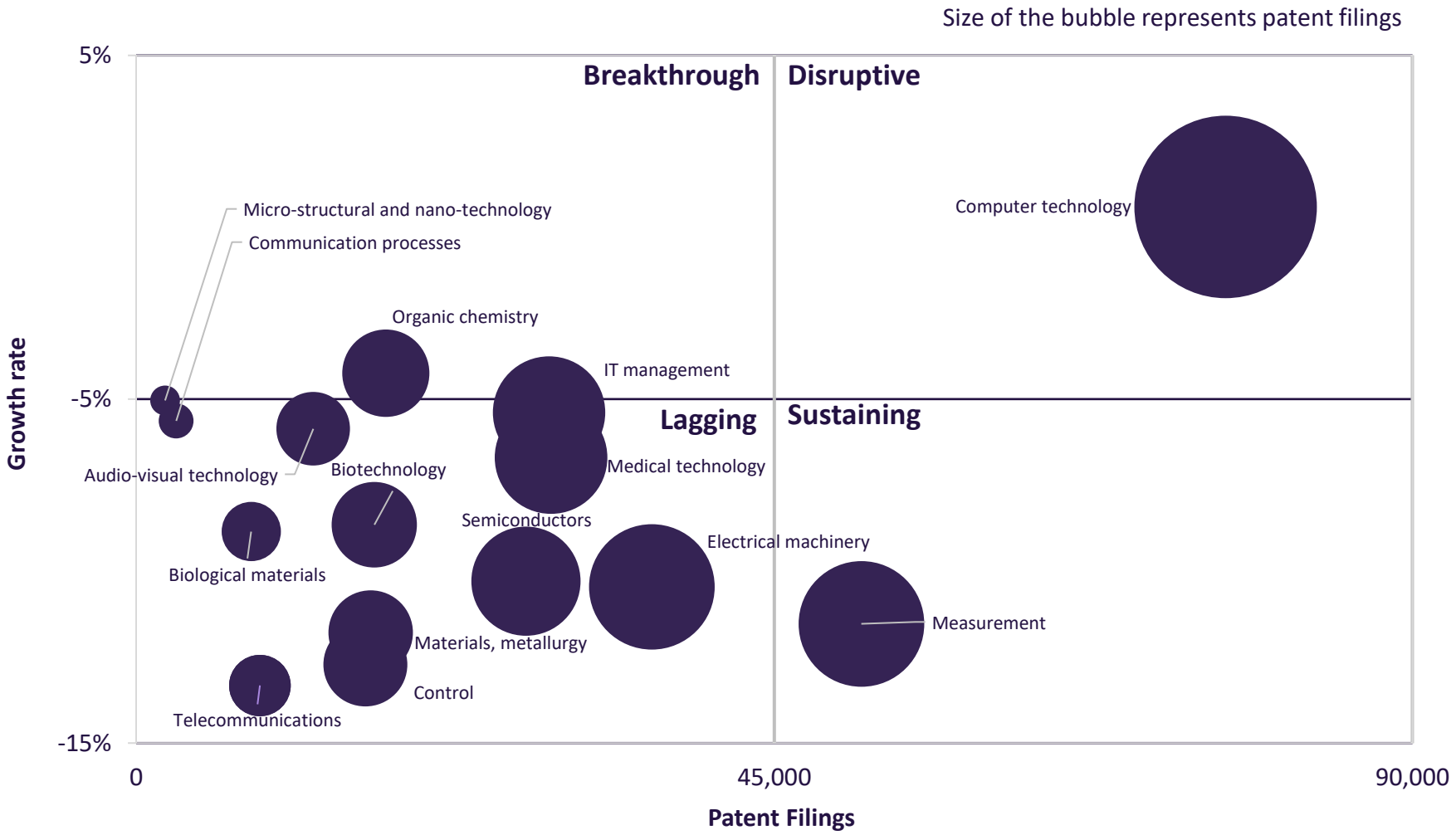


- According to GlobalData's Technology Foresights model, Intel is a prominent player in narrow-band Internet of things (NB-IoT) networks.
- Application diversity identifies the range of applications for the innovation which help to understand the additional fields in the innovation that is usable outside the patent's core technology area. While geographical reach signifies the geographical coverage of the patent filed.
- High innovation application diversity and high innovation geographic reach indicate that it is working in diverse application areas and different regions.
- The high application diversity of Micron Technology indicates that it is playing a major role through NB-IoT networks in 5G-related applications.

Source: GlobalData Technology Foresights

Computer technology observed the highest growth in Q2’22

IPC concordance technology leaderboard for top 15 technology fields in the last two quarters (Q2’21-Q2’22): filings Vs growth rate



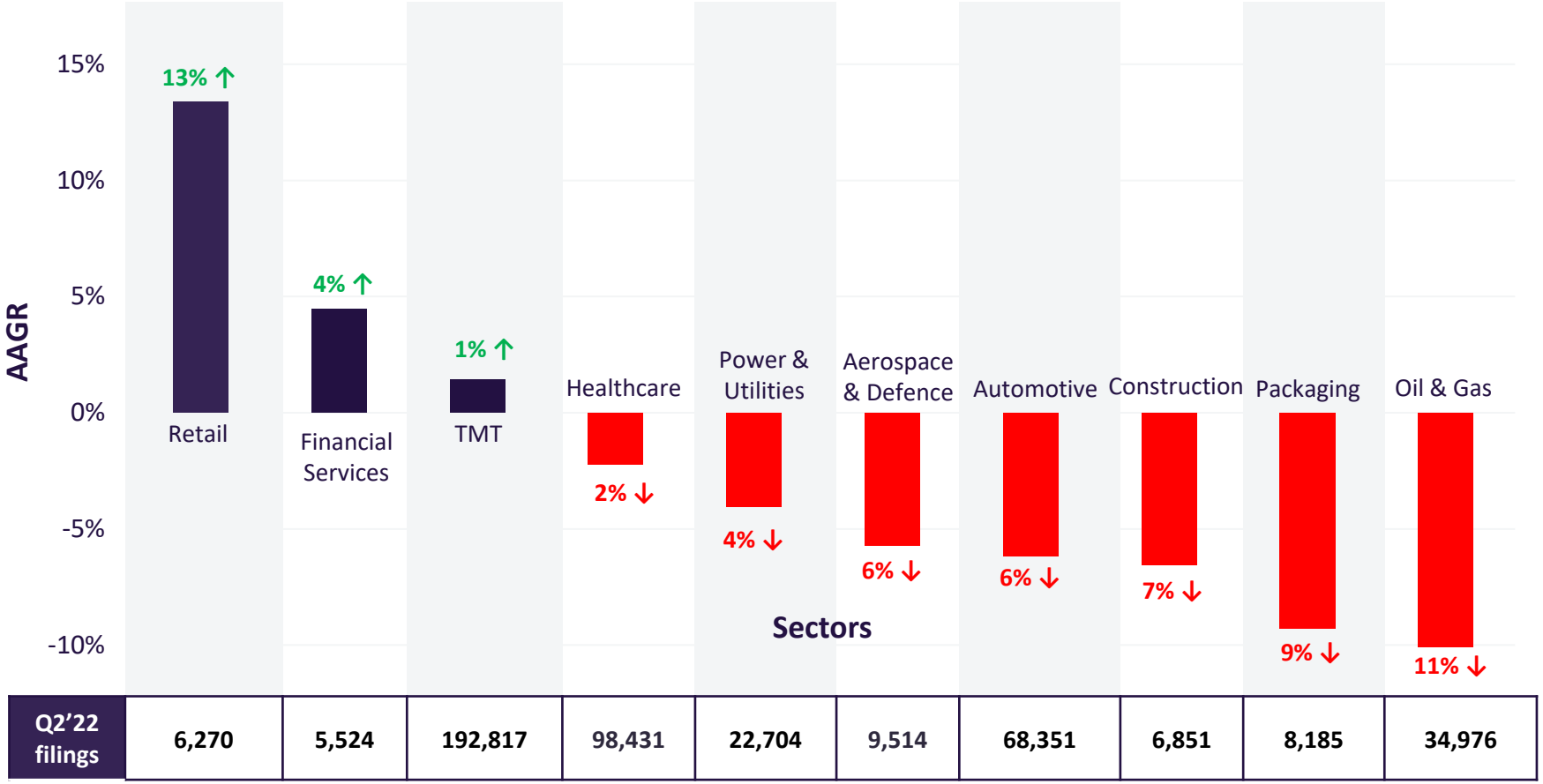
- Computer technology has witnessed the highest patent filings in Q2’22 with a growth of 1% compared to Q2’21. It primarily focuses on computer models based on neural networks, image data processing, and video recognition.
- The patent filings in computer technology were dominated by Samsung, IBM, and Micron Technology while China and US were the most preferred regions.

Source: GlobalData Patent Analytics
Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate. WIPO’s International Patent Classification (IPC) technology concordance table was used to convert IPC symbols into 35 corresponding fields of technology.

Top patented sectors

Retail witnessed 13% growth with its emphasis on digital payments

Top ten sectors based on AAGR: Q2’18-Q2’22



	Retail	Financial Services	TMT	Healthcare	Power & Utilities	Aerospace & Defence	Automotive	Construction	Packaging	Oil & Gas
Q2’22 filings	6,270	5,524	192,817	98,431	22,704	9,514	68,351	6,851	8,185	34,976

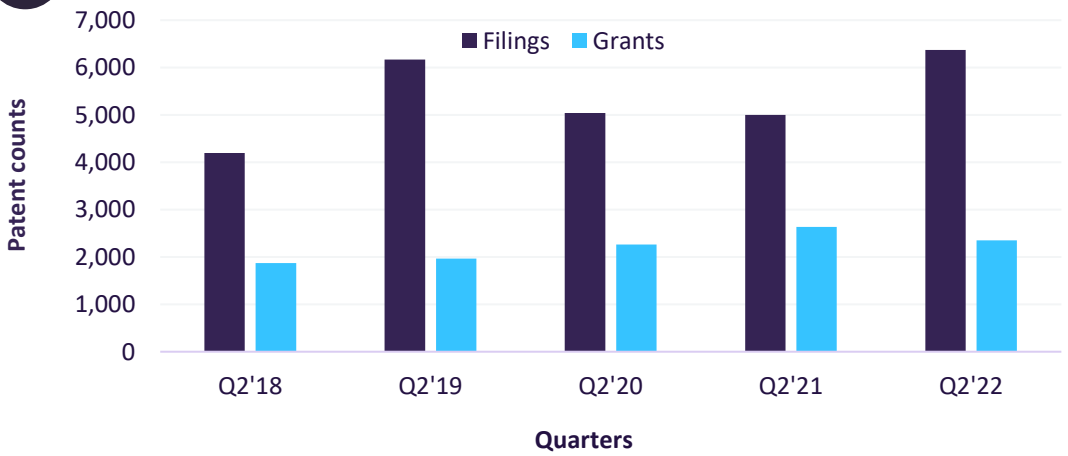
- Retail witnessed an AAGR of 13% with the highest share in digitalization, e-commerce, and fintech-related technologies.
- Financial services grew by 4% AAGR, primarily due to inventions in payment architecture, network communication protocols for network security, and machine learning models to predict market risk.
- TMT has grown by 1% because of increased research engagement in digitalization, cybersecurity, industrial automation, and health tech applications. The patent filings in the sector were dominated by Samsung, Huawei, and Qualcomm while China and US were the most preferred regions.

Source: GlobalData Patent Analytics
Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate. AAGR is annual average growth rate which is calculated for all the Q2 quarters of last five years (2018-2022). TMT is technology, media, and telecom.

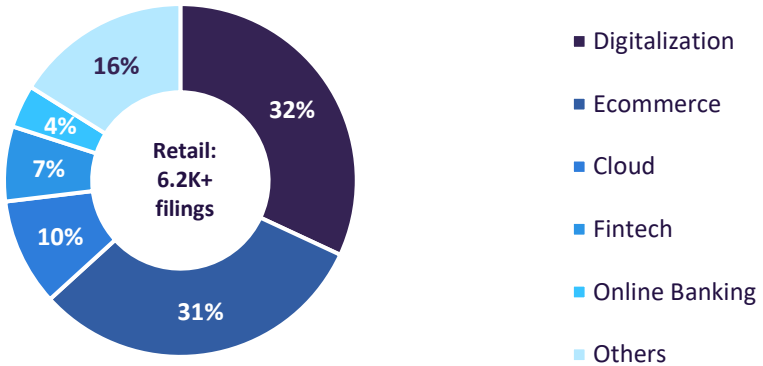
Digitalization in retail witnessed nearly 32% patent growth, Alibaba dominates the space

- Digitalization, for instance, data analytics to predict the future performance of a product, price optimization, and trend forecasting has the highest patent filings in retail.
- CN contributes to the highest patent filings in Q1’22; Alibaba is the largest contributor.

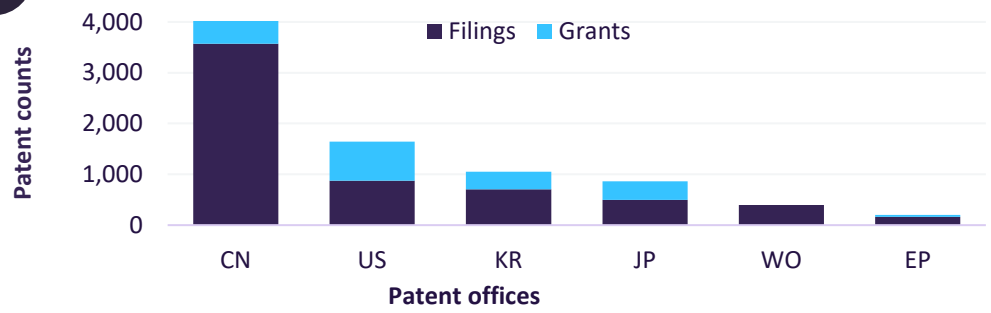
1 Patent filings and grants in retail: Q2’18-Q2’22



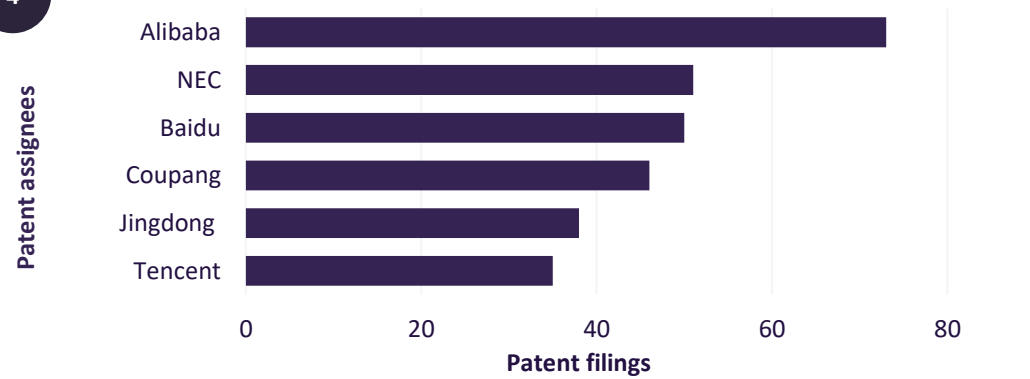
2 Patent filings of top five themes in retail: Q2’22



3 Patent filings and grants in retail by patent offices: Q2’22



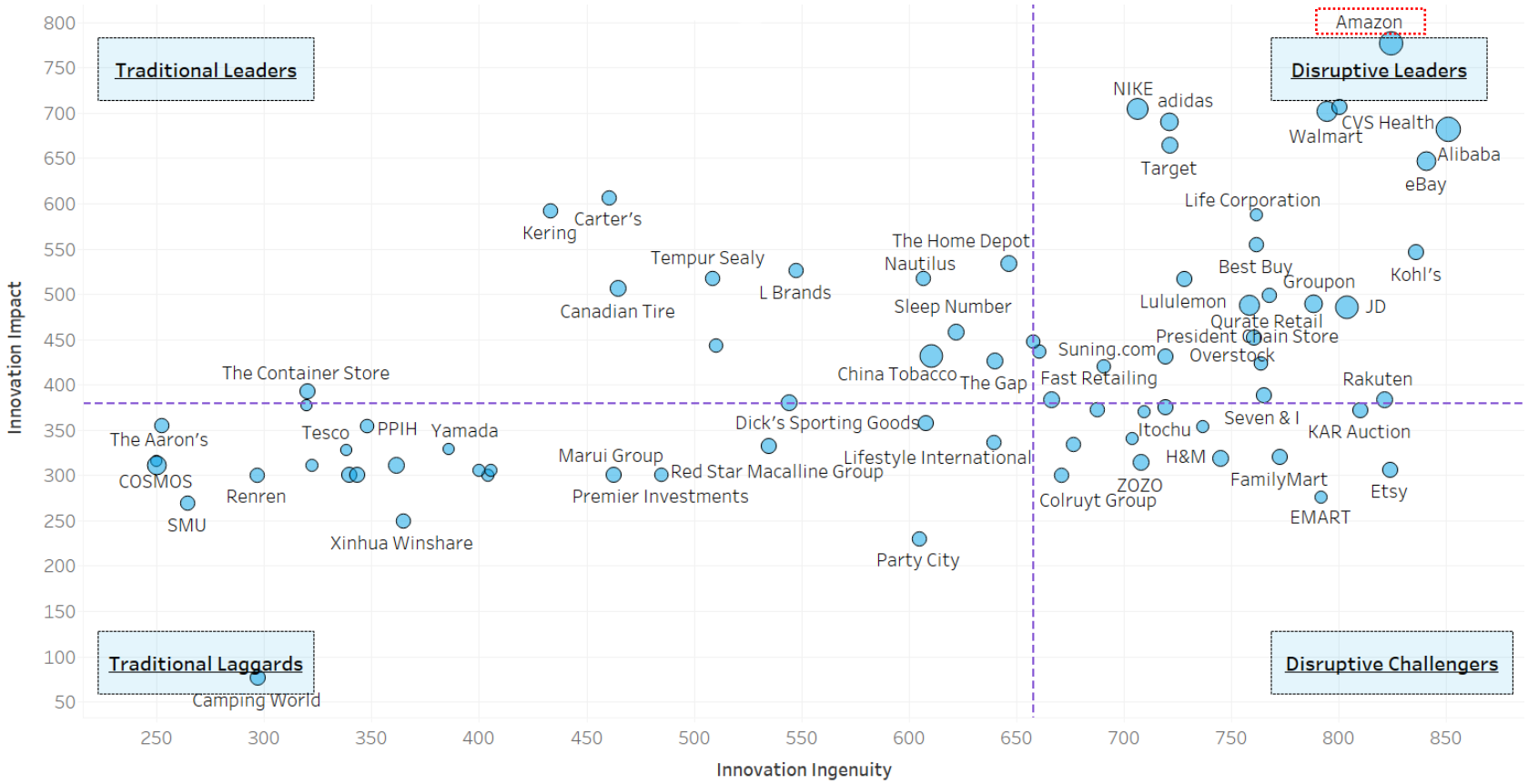
4 Patent filings in retail by top filers: Q2’22



Source: GlobalData Patent Analytics

Note: The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate.

Amazon has emerged as disruptive leading according to the innovation scorecard model in retail



- GlobalData's Innovation Scorecard compares and ranks more than 3,500 tier 1 public company based on their relative performance in 3 Innovation pillars: Intensity, Impact, and Ingenuity. The rankings are based on quantifiable data to ensure that it is objective and can be comparatively measured across companies from different sectors, geographies, and themes.
- The proprietary four-quadrant analysis identifies the market leaders, challengers, and laggards based on the innovation impact and disruptive potential for various companies. It indicates Amazon to be a disruptive leader in the retail sector.

Note: The size of the bubble refers to the score in Innovation Intensity (activity of innovation)

Source: GlobalData Innovation Scorecard

Licensing & litigation trends

Huawei’s licensing deal for IoT SEPs and Fintiv patent suit caught the media’s attention

Patent licensing in Q2’22:

Huawei and Nordic Semiconductor signed a licensing deal

June 17, 2022

Huawei signed a patent license agreement with Nordic Semiconductor. The agreement grants a fair, reasonable, and non-discriminatory (FRAND) royalty-bearing component-level license of Huawei’s low power wide area (LPWA) cellular IoT standard essential patents (SEPs) to Nordic and its customers. This agreement is set to bring greater commercial and legal certainty to the IoT industry.

IGT signs broad patent cross-licensing agreement with Aristocrat

April 12, 2022

International Game Technology (IGT) signed a broad patent cross-licensing agreement with Aristocrat that includes valuable patents related to game features and remote game server (RGS) technologies. Under the agreement, IGT will be able to offer licenses to the companies' combined game features and RGS patent portfolios to the global gaming industry.

Patent litigation in Q2’22:

NortonLifeLock owes Columbia university $185M over patent infringement

May 2, 2022

A federal jury found that two patents for cybersecurity technology that uses emulators to monitor programs for risky malicious behavior are infringed by a feature of five families of antivirus products made by NortonLifeLock. As a verdict, NortonLifeLock is obligated to pay Columbia University $185.1 million. The patented technologies can effectively distinguish normal computer operations from anomalous or malicious behaviors even if a malicious program has never been seen before and rapidly and efficiently share information about detected intrusions.

Fintiv filed a patent lawsuit against Walmart, Apple Pay, and PayPal

April 27, 2022

Mobile payment and commerce platform Fintiv has filed a lawsuit alleging patent infringement against PayPal, Apple Pay, and Walmart. According to court filings, Fintiv accused PayPal of infringing on five of its patents related to payment functions. Apple and Walmart have both violated the same payment patents. These three cases are quite important for the entire tech industry. The lawsuit was filed against PayPal earlier this year and asks for royalties, court costs, and damages.

Source: GlobalData Social Media Analytics and GlobalData News

GlobalData.

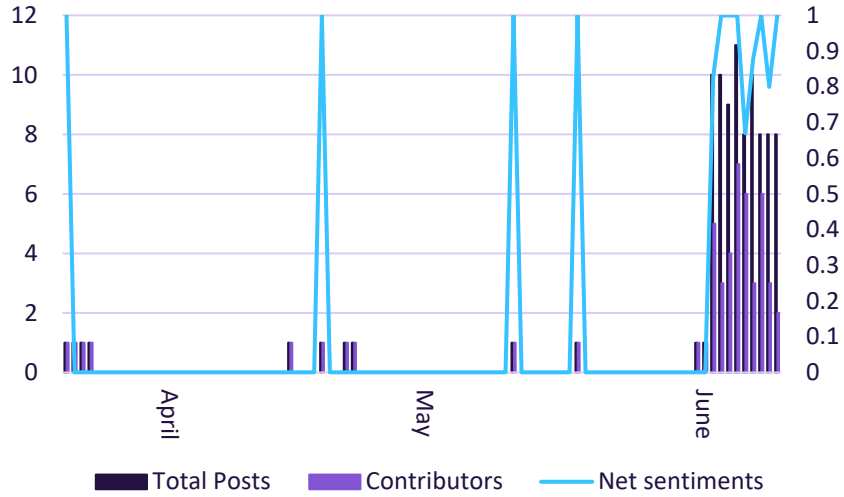
Social media & trend analysis

Crabwalk mode

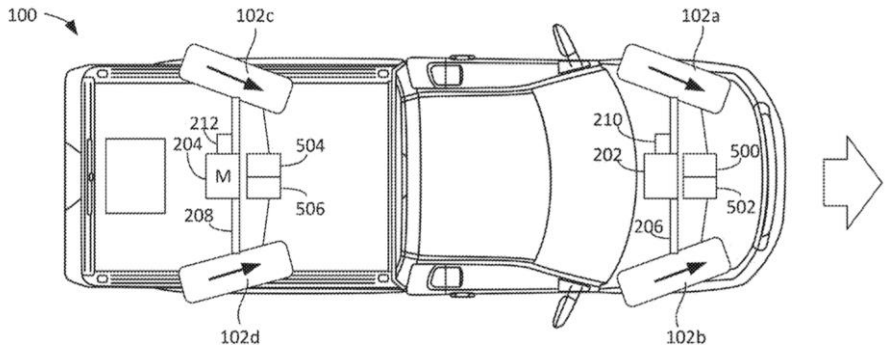
- The crabwalk mode is the most discussed topic in June 2022. It registered the highest social media activity in June 2022 where Hyundai has the highest mention.

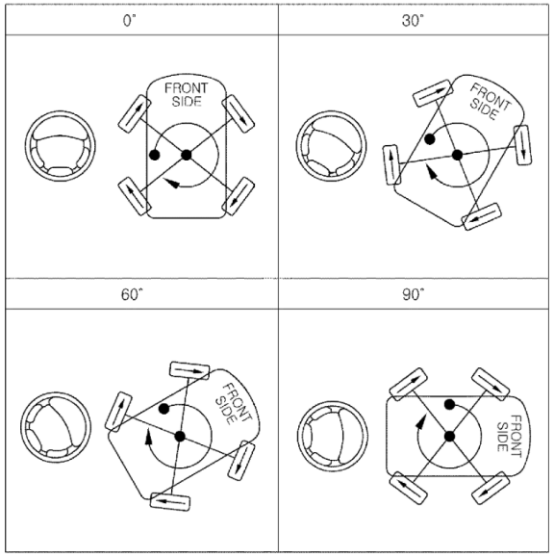
- Hyundai as well as Ford have filed a patent for an in-situ rotation system that mirrors crabwalk and will allow vehicles not only to spin around or go diagonally but it will also allow it to crawl completely sideways.

Social media sentiments around Crabwalk



Trending topics around crabwalk





US20220126914A1 & CN114312984A – Crawl operations for vehicles

Publication date – April 28, 2022 & April 12, 200

- Hyundai has patented a four-wheel fully independent steering system that allows the vehicle to make a U-turn while in an alley.

- Ford has patented a system that will allow a vehicle to turn wheels on the same axle opposite to one another through electric actuators and electric motors.

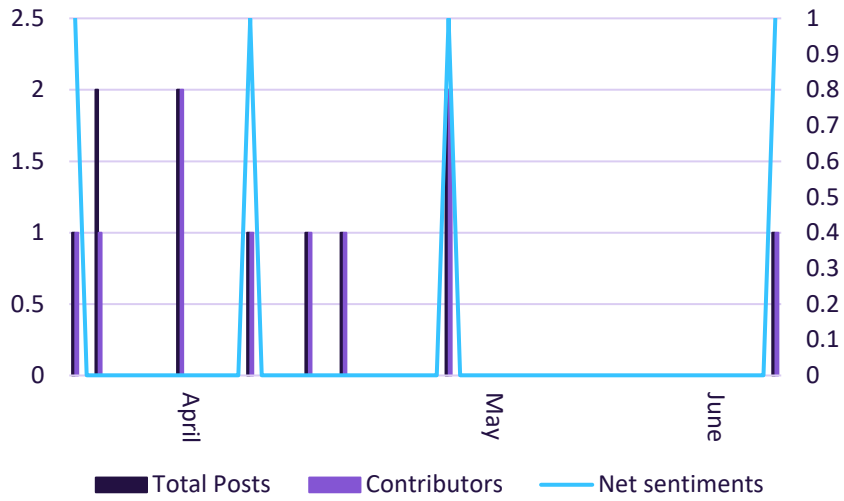
Source: GlobalData Social Media Analytics and GlobalData Patent Analytics
Note: Social media graphs represent the activity related to “Crabwalk” as a keyword on Twitter and Reddit during the period. Total Posts indicate no. of posts on a specific keyword, Contributors reflect the no. of unique users discussing the subject, and Net Sentiments indicate the positive-negative perspective of the subject.

AI Stethoscopes

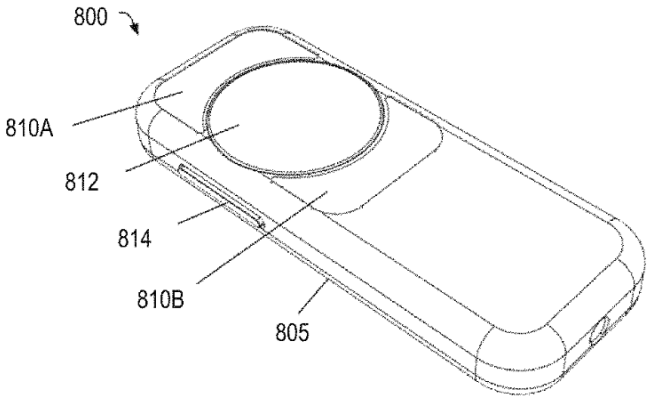
- AI stethoscope is the most discussed topic in all three months in Q2’2022. It registered the highest social media activity in May 2022 where Eko Devices is among the company listing.

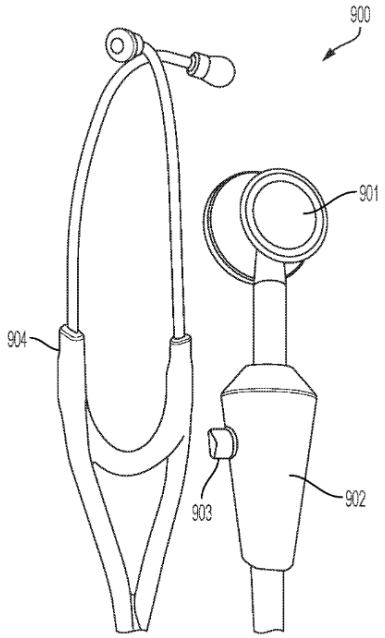
- Eko Devices, the US-based healthcare company, has filed a patent for an AI stethoscope for remote health monitoring.

Social media sentiments around stethoscopes



Trending topics around stethoscopes





US11363952B2 - Systems for remote health monitoring

Publication date – June 21, 2022

- Conventional digital stethoscopes streaming patient data for remote monitoring may not offer sufficient protection in the collection of robust data and/or integration with existing hospital systems.
- Eko Devices has patented an improved AI stethoscope that transmits the biological sensor data in real-time from a patient's transmitting device to a clinician's remote receiving.

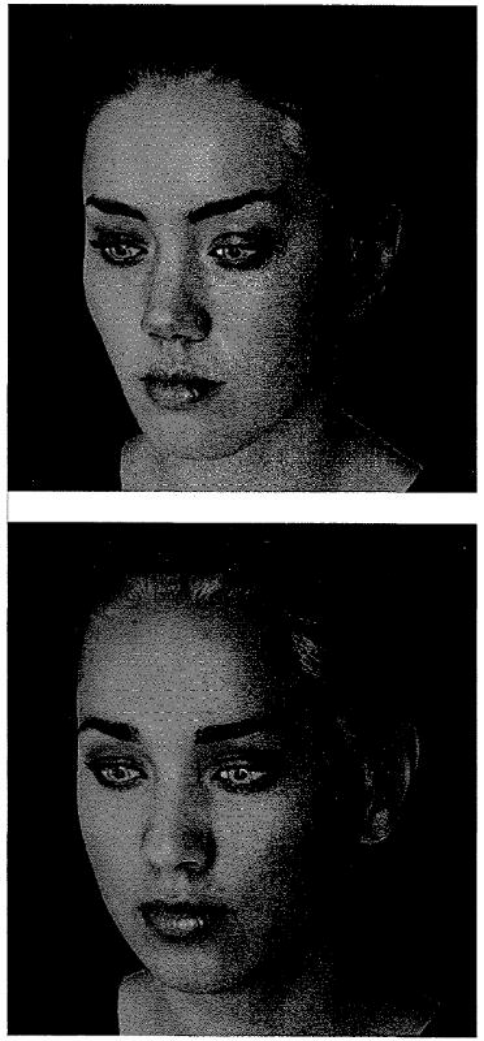
Source: GlobalData Social Media Analytics and GlobalData Patent Analytics
Note: Social media graphs represent the activity related to “Stethoscopes” as a keyword on Twitter and Reddit during the period. Total Posts indicate no. of posts on a specific keyword, Contributors reflect the no. of unique users discussing the subject, and Net Sentiments indicate the positive-negative perspective of the subject.

Soul Machine’s digital human is pushing the envelope of photorealistic digital character

US11354844B2 - Digital character blending and generation system and method

Publication date – June 7, 2022

- The traditional digital character blending system only blends the static faces and thus no dynamic expression is created. Moreover, the excess blending of characters results in more blurred characters. Soul Machine has patented an improved system for digital character blending with human-like features without compromising the fine details.
- The system applies the specified modification to the various basic model face shapes to generate a modified basic shape for the model.
- The deep learning model for the character system can learn, predict and apply demographic predictions.
- It allows customizing the geometry features like switching eyelashes, irises, teeth, tongue, hair, accessories, and clothing. Moreover, regional blending, bone structure preservation, texture blending, modifying skin imperfections, and digital makeup are among the significant features of the system.
- Here are a few patent applications from Soul Machine published in Q2’22 based on the digital brain, autonomous animation, and digital DNA studio to make a lifelike digital human: EP3824378A4, WO2022107087A1, EP3997668A1, CA3115027A1, WO2022107088A2.



Source: GlobalData Patent Analytics

Emotion intelligence in robots for social interaction is gaining traction in patent filings both by corporations and universities

CN111788621B - Empathetic personal virtual digital assistant

Publication Date – June 3, 2022

Conventional personal virtual assistants (PVA) responses and interactions tend to be robot-like, single-tone, and without emotion leads to poor user interactions. Microsoft has patented a PVA with empathetic responses for interactive interactions, improved user experience, and higher usage. These improved responses could be as simple as modifying the assistant's mood to the user's advantage so that it presents positive messages when the user is in a bad mood or muffles negative messages when the user is not handling things well.

US20220147153A1 - Social interaction by a robot device

Publication Date – May 12, 2022

The conventional interaction system between the user and the robot lacks emotional engagement and it is non-dynamic. Samsung has patented dynamic interactive social robots which interact based on the user's emotional state. the emotional state of the user by determining a set of parameters based on the input. The robot determines the emotional state using a set of parameters such as voice input, the pressure exerted by the user on the robot device, the heart rate of the user, a speed of a gesture, and a gesture pattern. The robot identifies it by using an emotion model mapping between the region on the robot device, a gesture, and an emotional state.

CN110555401B - Self-adaptive emotion expression system

Publication Date – May 3, 2022

Traditional robots cannot represent a particular emotional state by external factors and self-adaptive changes in response to human feedback. Zhejiang University has filed a patent for a self-adaptive emotion expression system based on expression recognition. It can employ facial expression recognition to analyze people's emotional states in a natural setting, and it can use motion and light expression modules to react to the user's emotional state.

CN108363978B - Emotion sensing method based on body language

Publication Date – April 22, 2022

Conventional emotion perceiving systems such as electrocardiogram, watching for facial expressions, texting, gesturing, and speaking, has proven to be effective system to convey emotions. However, such systems are ineffective in sensing emotions. The South China University of Technology has patented an improved emotional sensing system based on body language-based that combines the advantages of both deep learning and UKF (Unscented Kalman Filter).

Source: GlobalData Patent Analytics

Key considerations

- The report is based on GlobalData's Patent Analytics database which covers a bibliography from all 100+ patenting authorities.
- All patents are tagged to 20+ industry sectors and 180+ themes based on technology classification, keywords, and associated companies.
- Our patents database further disambiguates assignee names (350K names) and associates corporate tree hierarchy in current ownerships.
- GlobalData sources content directly from national patent offices every week.
- The data slice considered is from April 2022 to June 2022.
- The sectorial and thematic analyses are considered based on their average annual growth rate (AAGR) from Q2’18 to Q2’22.
- The YoY growth is calculated by considering the corresponding quarter in the previous year.
- Patents were analyzed based on IPC concordance provided by WIPO where the growth was calculated on a YoY basis in Q2’22.
- The report includes all the published utility, design, divisional, continuation, continuation-in-part, grants, and utility models while excluding defensive publications, reissue, search reports, statuary invention registration, and re-examination certificate.
- The patent offices are represented as CN -China, US- USA, JP- Japan, WO- WIPO (world intellectual property organization), EP- Europe, KR- South Korea, DE - Germany, AU - Australia, GB- Great Britain, RU- Russia, DK- Denmark, and IL- Israel, PCT – patent corporation treaty.

Glossary

Patent
Patent is the document defining a right conferred by the grant but is often used to mean published specification

Assignee
An individual or group of people who have the permission or right to manufacture or license an invention by the inventor, bound by contract

Application date
The date on which the application, which contains disclosure of the invention is submitted to the patent office

Publication date
The publication date is the date on which a patent application is first published. It is the date on which the document is made available to the public, thereby making it part of the state of the art. A publication date range can be selected based on the user's requirement to search for prior art between the date ranges

Filings
These are pre-grant publications published by a patent authority once the patent is filed by an applicant. In most authorities, the patents are usually published within 18 months from the date of filing depending on the patent laws of that authority

Grant
These are patent documents issued/granted by the patent authority as per patent laws in the patent authority

Patent Offices
The public body which received and grants patents in each country

IPC
IPC stands for international patent classification, a hierarchical classification system used primarily to classify and search patent documents according to the technical fields they pertain

Themes
GD defined specific themes

Sectors
GD defined specific sectors

PIT parameters
Technological Scope - No. of CPCs in each company of the company portfolio.
Global Exploitation IP - No. of patent offices of the granted patents in a portfolio.
Originality Index - Inventions rely on many diverse knowledge sources.
Generality Index - Dispersion of a patent’s knowledge through forward citations.
Cooperation Intensity- No. of co-assigned patent applications with partners in the portfolio.

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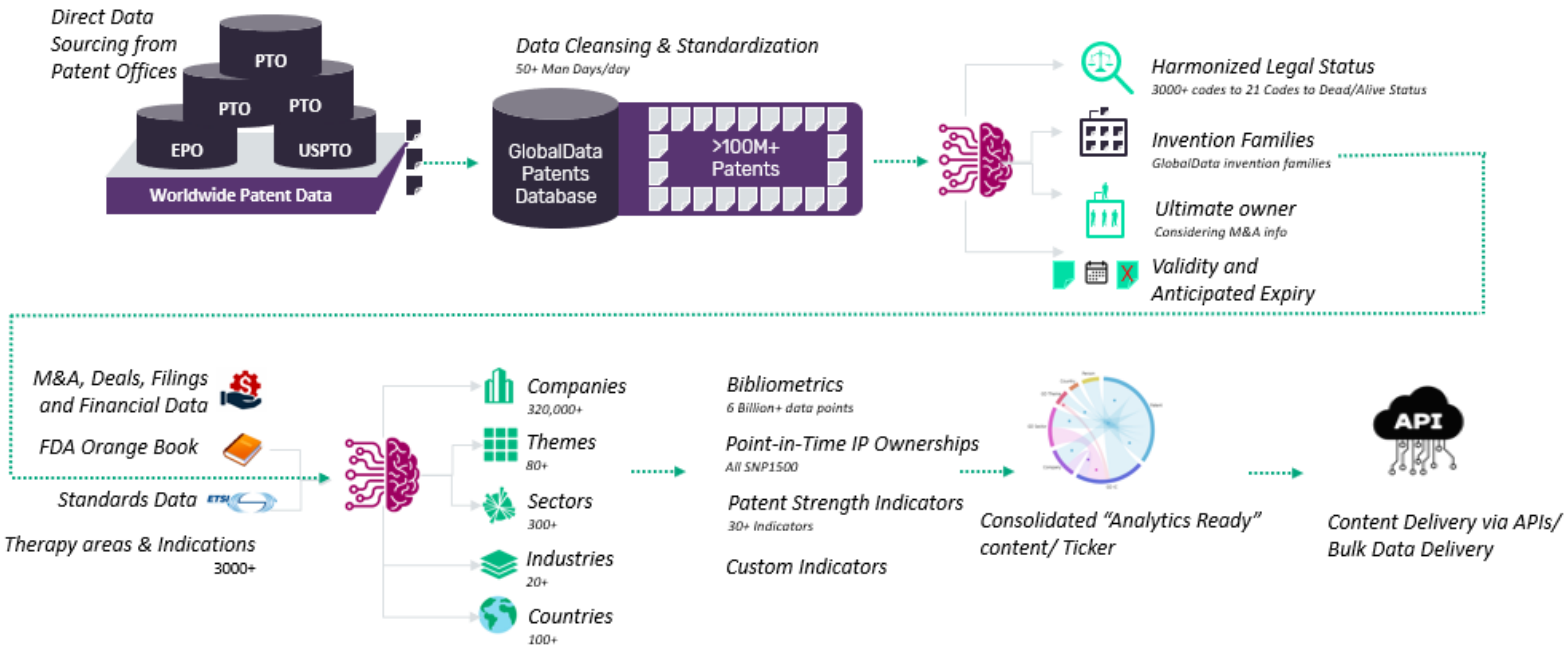
Methodology

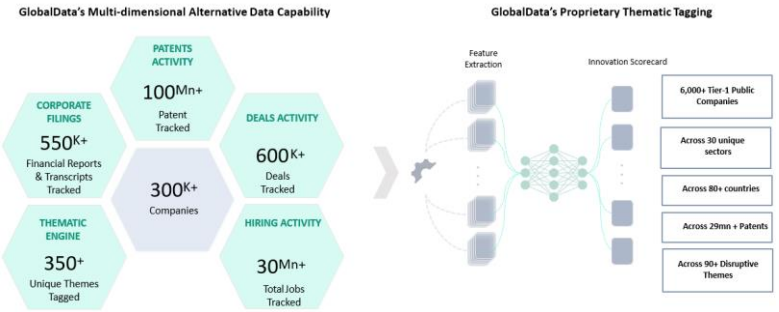
Our approach towards consolidating “analytics-ready” worldwide patent data

GlobalData provides patent data through patent analytics tool as well as through sFTP and API to its customers.

GlobalData’ s approach for patent data processing



Contextualizing patent data in alternate data universe



Dataset Name	Coverage
Historical Start Date for PIT	January 2000 onwards
Data Coverage	Over ~112 M patents as on 7th January 2022
Regional Coverage	Asia-Pacific; Europe, Middle East & Africa; North America; Latin America
Country Coverage	104 Authorities (specifics available on request)
Company Coverage	*Public Companies* – 13,000 *Start-up* – 9,800+ *S&P1500* – 1,400+ *Private Companies* – 12,000 *S&P500* – 380+ *MSCI EM & DM* – 1,500+
Sector Coverage	18 Industries + Disruptor platform (specifics available on request)
Taxonomies Used	➢ GlobalData’s industry and sector taxonomy *(6,060 Sectors)* ➢ GlobalData’s proprietary Thematic taxonomy *(186 Themes)* ➢ Cooperative Patent Classification (CPC) ➢ International Patent Classification (IPC)
Identifiers	ISIN, Tickers for publicly traded companies.
Patent Indicators	40+
Availability of Historic Datasets	From July 1782 onwards with Thematic taxonomy
Collection / Delivery Time	Weekly
Lag Time	+14 days
Delivery Methods	API or customized FTP
Delivery Formats	JSON, CSV, XML

- Our patent data is directly sourced from Global patent offices such as USPTO and EPO. The update frequency depends on the data that we are sourcing. For instance, US grants and applications are sourced directly from USPTO every Tuesday and Thursday in a week while the Assignment data is updated daily in the GD patent backend database.
- The data is fed into our state-of-the-art data consolidation work where we cleanse, standardise, and further enrich the data by tagging it to our industry leading propriety GD taxonomies (Sectors, Themes, Companies, ICs & Countries).
- The data is available through GlobalData ICs or sFTP dump or from API.

GD Patents Data Advantage

Worldwide Content

Global patent database covering Patent bibliographic information from 105+ countries, including Full Specifications, Legal Event notifications from US and EP.

Industry leading

Unique proposition made possible by expert analysis, thematic and sectoral tagging and generation of patent derived indicators based on advanced pat- informatics.

Analysis Ready Data

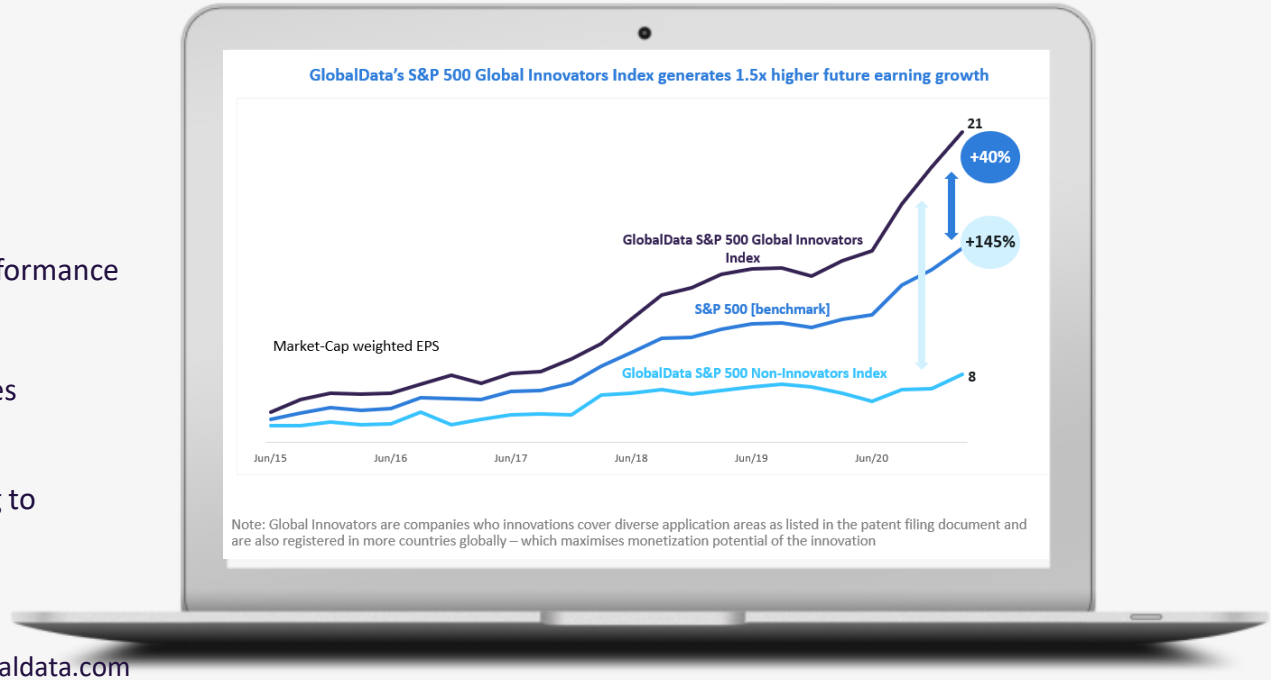
Fit for use towards - Identifying Investible opportunities, P-I-T Portfolio Evolution, Thematic Investment, Innovation Benchmarking, League-tables, CI, Portfolio Pruning, Valuation.

Battle Tested

- 3%-8% Annualized Alpha
- 2.2x higher earnings potential
- Outperformance 85% of the time
- Beats 3rd party innovation indexes
- Multiple thematic innovation indices

Patents Publications and Performance Indicators Database Profile

131M+	Published Patent Records	370K+	Company Portfolios
105	Countries	40+	Patents Derived Performance Indicators
6000+	Industry Sectors & Sub-sectors	20+ yrs	Historical Time Series Data
180+	Patents Tagged Themes	200+	Experts contributing to deliver quality data product



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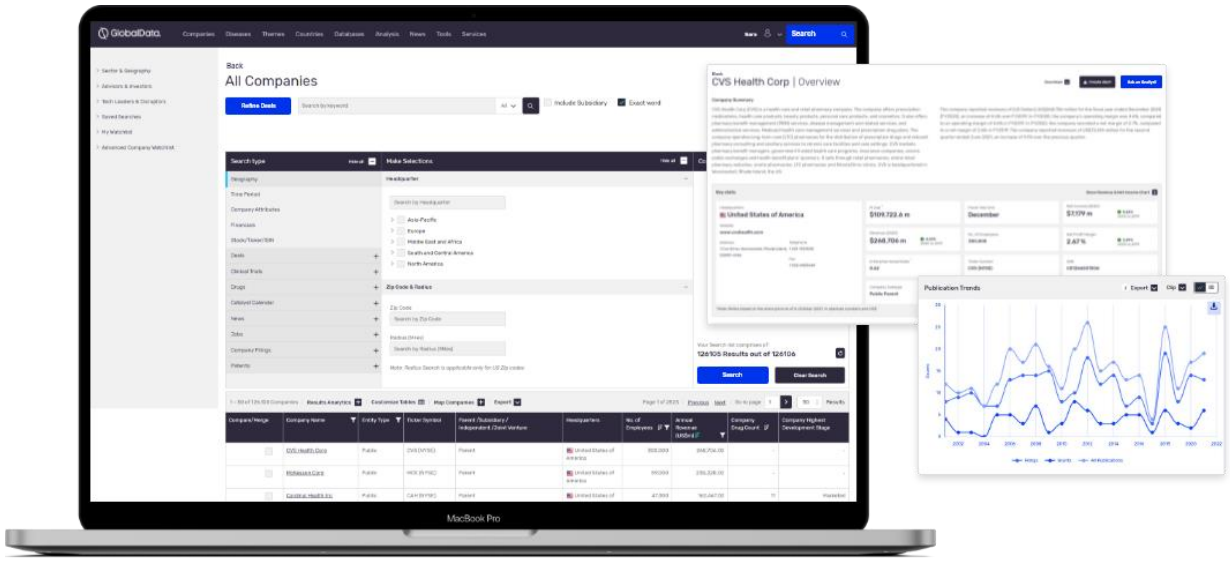
More about us

About GlobalData

GlobalData is a leading provider of data, analytics, and insights on the world's largest industries.

In an increasingly fast-moving, complex, and uncertain world, it has never been harder for organizations and decision makers to predict and navigate the future. This is why GlobalData's mission is to help our clients to decode the future and profit from faster, more informed decisions. As a leading information services company, thousands of clients rely on GlobalData for trusted, timely, and actionable intelligence. Our solutions are designed to provide a daily edge to professionals within corporations, financial institutions, professional services, and government agencies.



Unique Data

We continuously update and enrich 50+ terabytes of unique data to provide an unbiased, authoritative view of the sectors, markets, and companies offering growth opportunities across the world's largest industries.

Expert Analysis

We leverage the collective expertise of over 2,000 in-house industry analysts, data scientists, and journalists, as well as a global community of industry professionals, to provide decision-makers with timely, actionable insight.

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We help you work smarter and faster by giving you access to powerful analytics and customizable workflow tools tailored to your role, alongside direct access to our expert community of analysts.

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We have a single taxonomy across all of our data assets and integrate our capabilities into a single platform – giving you easy access to a complete, dynamic, and comparable view of the world's largest industries.

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customersuccess.disruptor@globaldata.com