

Patent Information as a Tool to Understand the Impact of the COVID-19 Pandemic on Technological Transformation

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Introduction

The COVID-19 pandemic has changed the face of the world and transformed our lives forever. Technology has not failed in the face of this transformation.

The pandemic has stimulated technological innovation and we have witnessed the production of an anthology of effective technical solutions deployed to deal with the pandemic.

Patent information serves as a valuable resource for studying and understanding the effects of the COVID-19 pandemic on technological advancement. Patents not only represent novel inventions and technological developments but also reflect the strategies taken by organizations to adapt and respond to the crisis. By analyzing patent data, researchers can gain unique insights into technology trends, innovation patterns, and the overall impact of the pandemic on transformative technologies.

This article aims to explore the relationship between the COVID-19 pandemic and technological transformation through a comprehensive analysis of patent information. By examining the patent landscape across various industries and sectors, we aim to provide a nuanced understanding of how the pandemic has stimulated or hindered technological advancements in different areas. Furthermore, this research seeks to identify potential areas for future technological growth and innovation in a post-pandemic world.

Method

We propose these methodology steps, to provide a comprehensive analysis of patent information to understand the impact of the COVID-19 pandemic on technological transformation.

1. Data Collection:

- Obtain a comprehensive dataset of patent information from relevant patent databases, such as the United States Patent and Trademark Office (USPTO), European Patent Office (EPO), and World Intellectual Property Organization (WIPO).
- Retrieve patent data covering the pre-pandemic, pandemic, and post-pandemic periods to capture the relevant time frame of technological transformation.

2. Patent Analysis Techniques:

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- Utilize patent citation analysis to evaluate the impact of COVID-19 on technological advancements. Analyze the number of citations received by patents filed during the pandemic and measure their influence on subsequent inventions.
- Conduct technology mapping to visualize the interconnectedness of different technological areas and examine how the pandemic has influenced the clustering of technology domains.
- Employ thematic clustering to identify emerging technology themes or areas that experienced significant growth during the pandemic. This analysis can highlight specific sectors and industries that underwent transformation in response to the crisis.

3. Data Visualization and Interpretation:

- Present the findings using appropriate visualizations, such as graphs, charts, and maps, to illustrate trends, patterns, and clustering.
- Analyze the patent data to identify sectors or industries that have experienced substantial shifts or disruptions due to the COVID-19 pandemic. Examine the changes in patent filing trends, the emergence of new technologies, and the impact on established technological domains.

4. Comparative Analysis:

- Compare the pre-pandemic and post-pandemic patent data to assess the overall impact of the COVID-19 crisis on technological transformation.
- Identify specific areas where patent filings have increased or decreased during the pandemic, indicating the sectors that have been highly influenced or disrupted by the crisis.

5. Future Opportunities and Challenges:

- Explore potential opportunities and challenges for technological transformation in a post-pandemic world based on the lessons learned during the crisis.
- Discuss the implications of the findings for policymakers, business leaders, and researchers in terms of adapting to the evolving technological landscape and fostering innovation.

6. Limitations:

- Acknowledge any limitations of the research, such as potential biases in patent data, the impact of geographical variations, or other factors that may affect the generalizability of the findings.

The combination of patent citation analysis, technology mapping, thematic clustering, and comparative analysis will help uncover insights into the changes and opportunities that have arisen in various sectors during this unprecedented time of global crisis.

Adaptive Technology: Overcoming the Challenges of the COVID-19 Crisis

The covid 19 has Changed forever the face of the world. We are happy to see that Technology was not failed to face this challenge.

Fortunately, the Pandemic has stimulated Technological Innovation, and we have seen the development of effective Technology to deal with the pandemic.

Figure 1 shows that we have many new patent applications & related.

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About 1882/ New patents, 78% of these patents was for the development of COVID 19 vaccines 22% are related to COVID-19 therapeutics

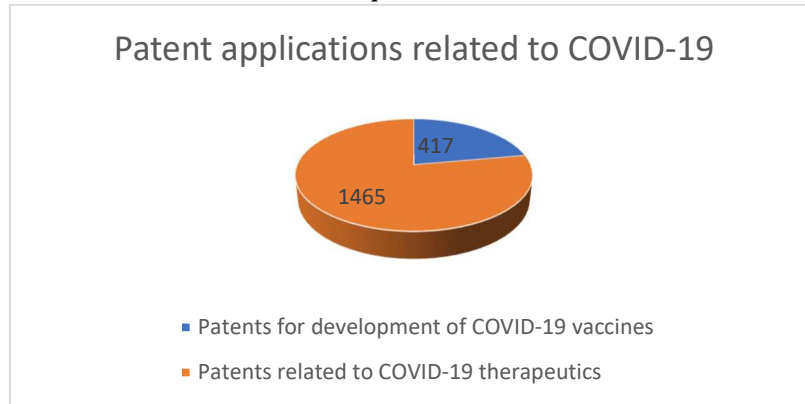


Figure 1: Patent Applications related to Covid 19

innovations were more preventive than corrective.

Digital tools experimented, and search techniques were adapted to minimize the spread of the virus, thus seeking to

- Limit the mobility of people
- Reduce contact between people

The effort was done to detect virus symptoms develop the vaccine and to provide treatments

So, we have seen the development of flowing technology

- A.I
- Bluetooth
- GPS
- Robots.

By Employing an interconnected Network IoT was useful for monitoring patients and in Employing an interconnected Network IoT was useful for monitoring patients, increasing their satisfaction and reduces the readmission rate in the hospital

We can easily imagine that IoT is the technology of the future, that it possible because the availability of the internet, the reduction of hardware costs, and more connected people using Smartphones Witch which make collecting data easier.

Researchers have made a huge effort to develop a vaccine, but the challenge was to find the best efficient way to bring this vaccine to people around the world.

Drones, robots, and audiovisual technology were an alternative to reducing human interaction. The mobile devices, Bluetooth and GPS were the supporting technology for people's health distance monitoring.

IoT is also known as the Industrial Internet, it's several machines and apparatus that can efficiently interact with each other, it's the future of technology. This will be possible by the wide availability of the Internet, the reduced cost of hardware, and an enormous

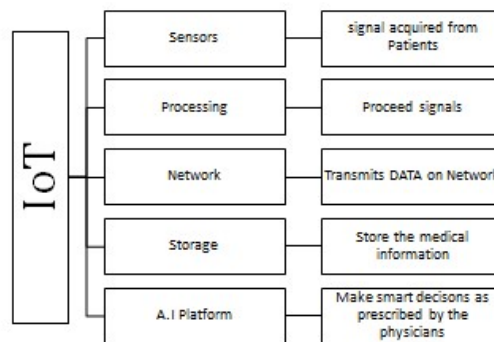
amount of people using smartphones, wearables capable of collecting data, and other “smart” products

IoT can impact every face of our way of life:

- manufacturing
- Health and medicine.
- Transportation.

IoT can collect Data (sensors), and Process these Data, share, store, and analysis these DATA. to make and produce smart output

Architecture of IoT Medical care



the Statistics from WIPO, Shows, that India was the most Innovative Country in IoT technology to Face COVID.

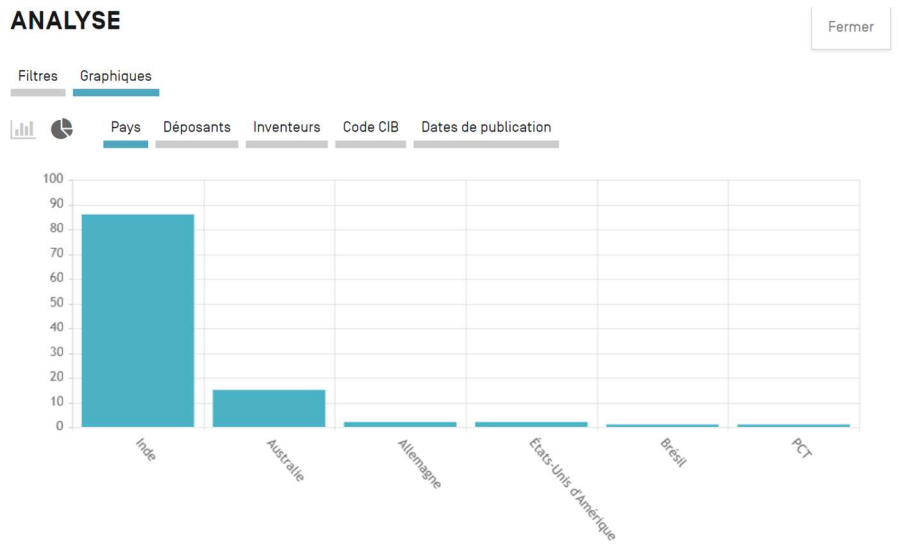


Figure 2 Distribution of patents IoT technology to Face COVID-19

The evolution of IoT patent filings reflects the rapid pace at which technological innovations are taking place within the IoT landscape. By analyzing IoT patent data, we gain valuable insights into the trends, patterns, and emerging technologies that shape the future of IoT.

Understanding the evolution of IoT patent filings is crucial for technology developers, policymakers, and businesses seeking to navigate and capitalize on the opportunities within the IoT ecosystem. and 2022 has seen most Patent products Figure

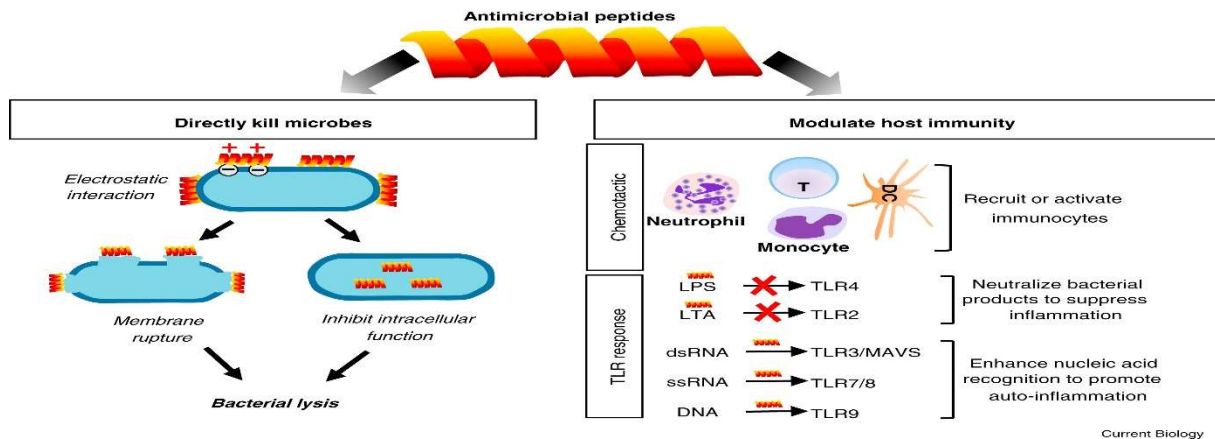


Figure 3 Evolution of IoT patent filings

The Rise of AI: Revolutionizing the Fight against COVID-19

Researchers have been actively leveraging the power of artificial intelligence (AI) to combat the COVID-19 pandemic on multiple fronts. One significant development involves the configuration of AI systems to aid in the discovery of new antibiotics to effectively treat COVID-19 infections.

The potential of AI in discovering novel antibiotics lies in its ability to analyze vast amounts of data and identify molecular structures with potential antimicrobial properties. By training AI algorithms on databases of known drug compounds and their interactions with various pathogens, researchers have enabled these systems to autonomously search for chemical compounds that could effectively target and neutralize the virus responsible for COVID-19.



A.I application was developed for earlier warning by predicting Contamination, delivering materials by drones, and monitoring.

When we look at WIPO Statistics that is Indian occupied the first nation to produce. A. I Solutions to fight against COVID 19

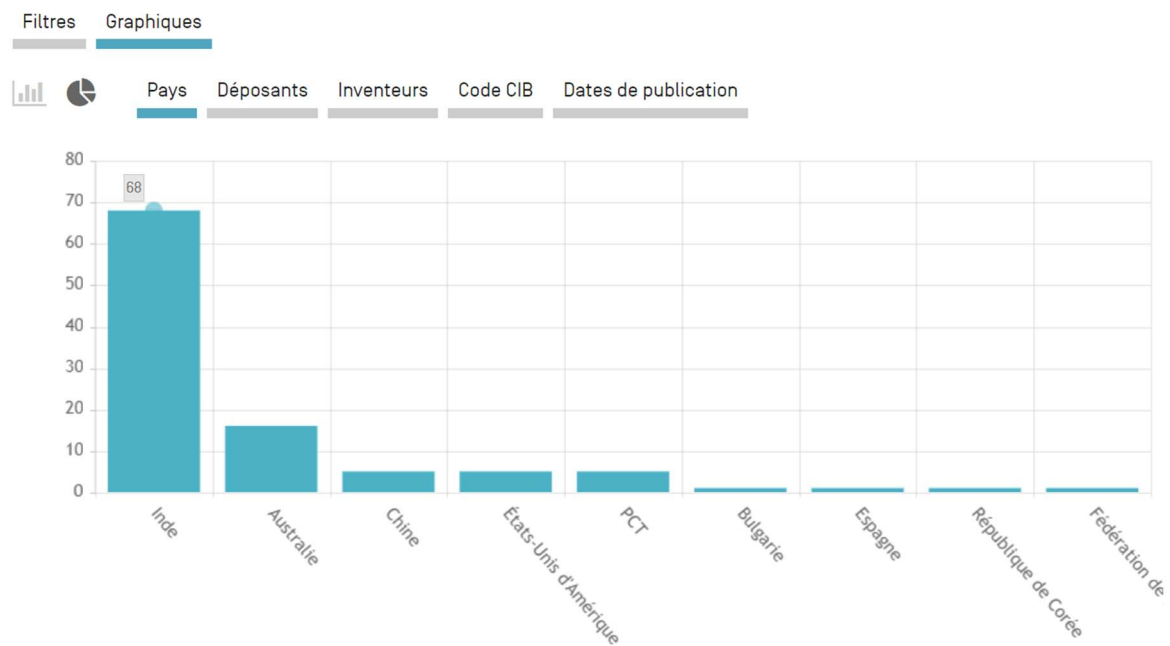


Figure 4 Evolution of patents by filing country

and 2022 was the most productive year.

Table Examples of AI applications at different stages of the COVID-19 crisis

Research Acceleration	Detection	Early Warning Detection of anomalies and digital precursor signals	Diagnostic Pattern Recognition from Medical Imaging	
	Prevention	Prediction Calculate Probabilities of Contamination of a Person	Supervising Real-time contagion tracking and tracing	Information Personalized new to fight misinformation
	Response	Execution of tasks Use of drones for transporting materials in high-risk areas	Service Automatization Deployment of virtual assistants and conventional robots for triage	
	Reprise	Monitoring Monitoring the economic recovery via satellite, GPS, and social media data		

table show different aspects of prevention and diagnostic technologies.

Under "Prevention," the table includes "Early Warning" as a key feature. This suggests that the technology highlighted in this section focuses on detecting potential issues or dangers before they fully materialize. It could be used for various purposes such as early detection of natural disasters, security threats, or potential malfunctions in systems.

In the next section, "Diagnostic," the table highlights "Pattern recognition from medical imaging." This indicates that the technology discussed in this section focuses on analyzing medical images, such as X-rays or MRI scans, to identify patterns or abnormalities that could indicate potential diseases or conditions. This could greatly assist medical professionals in diagnosing and treating patients effectively.

Overall, this table suggests the importance of advanced technologies in both prevention and diagnostics, providing early warnings and facilitating accurate diagnoses through cutting-edge techniques such as anomaly detection and pattern recognition.

A New Era of Drone Technologies

Drone technologies were helpful. and the innovation was developed in power remote control, and enhanced Autonomy. and autonomous pitting of these drones.

The drones were used to limit the disease spread and to fight COVID-19.

Drones make it easy to deliver medical, and means to inaccessible areas

The drone was used for crowd surveillance, public announcements, and spraying disinfectants in a contaminated area.

Drones have emerged as a valuable tool in fighting disasters and disease outbreaks, including the unprecedented global challenges posed by the COVID-19 pandemic. Various countries around the world have tapped into the potential of drone technology to effectively counter the spread of the virus and mitigate its impact.

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One prominent application of drones during the COVID-19 pandemic has been in enforcing social distancing measures and monitoring public spaces. Equipped with cameras and sensors, drones can monitor public areas, ensuring compliance with safety protocols and identifying areas of potential overcrowding. This capability has allowed authorities to take proactive measures to prevent the spread of the virus and enforce necessary restrictions.

Additionally, drones have been extensively utilized for transportation purposes in areas affected by the pandemic. With their ability to navigate challenging terrains and bypass traffic congestion, drones have been instrumental in delivering essential supplies, including medical equipment, testing kits, and even medication, to remote or inaccessible regions. This has proved particularly crucial in ensuring the timely provisioning of resources to healthcare facilities and communities in need.

Moreover, drones have been deployed for aerial spraying operations in efforts to sterilize large public spaces, including hospitals, parks, and other high-risk areas. These unmanned vehicles have the capability to cover vast areas quickly and efficiently, reducing the risk of human exposure and ensuring thorough disinfection in a timely manner.

Beyond addressing the immediate challenges posed by the pandemic, drones have also played a crucial role in collecting valuable data and supporting research efforts. Equipped with advanced imaging technologies, drones have been utilized to survey and map areas affected by COVID-19, providing critical data for mapping the spread of the virus, identifying hotspots, and assisting in resource allocation and containment strategies.

Countries worldwide have joined forces with numerous researchers and innovators to find ingenious ways of using drones to fight pandemics at their best.

Drones can be helpful to facilitate access to medical care in areas without ground infrastructure transportation means to delivery of necessary health services and supplies in a time-effective manner Drones travel faster than any manned vehicle and hence can overcome topographic challenges that would be incredibly challenging to overcome by other forms of transportation.

Drones with thermal cameras can be very helpful for crowd surveillance, especially during the COVID-19 pandemic.

Many countries have deployed drones for making public announcements for public awareness during pandemics to stop the spread of diseases.

Drone technology is useful to people where there is a need to avoid direct contact with viruses and bacteria. Using drones, disinfectants can be sprayed in contaminated areas.

- Drone to distribute drugs avoid human intervention and social distancing to defeat covid-19 pandemic in healthcare.
- Pesticide sprayer & covid sanitization intelligent drone

- Provide emergency medication in the micro containment areas

The WIPO Statistic shows the tendency of the most productive country in Drone Technology.

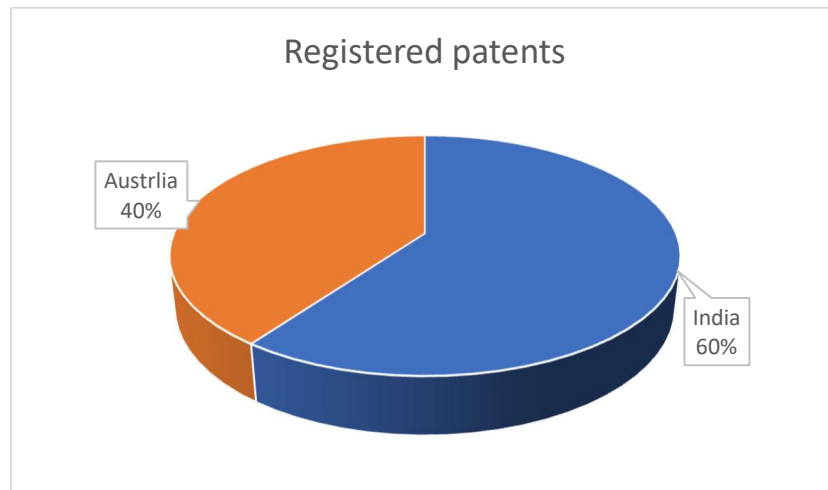


Figure 5 Leading Nations' Patent Filing Record in Drones for COVID-19 Response"

The two countries that hold the record for filing patents in the field of drones used to fight against Covid-19 Austria and India

As countries actively pursue patents for their drone technologies aimed at combatting COVID-19, they demonstrate their commitment to driving innovation and utilizing every available tool in the fight against the virus. By protecting their intellectual property, these nations ensure that their inventive solutions can be effectively harnessed in the present crisis and beyond, laying the foundation for a safer and more resilient future

Patents filed in:

- Drag's distribution.
- Spraying and Sanitization.
- and emergency medication.

CONCLUSION

- The Covid 19 pandemic has changed our way of life, we consider things in different manners. Researchers are looking for the best solutions to make our life easier. All seen technology in this presentation is destined to prevent and attenuate the pandemic impact and to restore a normal life after the pandemic
- IoT has brought a huge contribution to resolving the problems caused by the actual pandemic, it's a promising technology that shows enormous potential to collect,

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analyze, and efficiently health data transmitting to concerned departments, so it's a preferred choice for monitoring and managing diseases. Drones have changed the concept of things delivery and robots replaced humans so they can reach inaccessible places.

- Bluetooth and GPS were used to detect contaminated persons
- Telemedicine will be extremely developed through the association of IoT, drones, and robots. This can be used to dispatch limited clinical resources to a huge geographic area, it will ensure the care quality and accessibility during the pandemic.
- All these technologies will be developed and will aid humanity to overcome the Covid 19 Pandemic.

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