# Japanese Artificial Intelligence in a COVID-19 dominated world.

A view of the Japanese AI developments during the COVID-19 pandemic and the Japanese vision towards the future.

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The COVID-19 pandemic leaves a devastating trail through social life and economies all across the world. The pandemics' impact is accompanied by insecurity about the persistence of the virus. In the current most optimistic pandemic scenario, an effective vaccine will take at least a year to be widely available (OECD, 2020). In other words, we need to adapt to a new reality for at least a year or longer. The new reality has affected the Japanese R&D strategy as well, demanding a response from Japan and resulted in several useful Japanese AI applications, demonstrating their worth during the pandemic. Proving that, while being in the midst of the pandemic, technological developments have not come to a standstill and innovative ideas can thrive during chaotic times. AI in medical areas showed several useful applications to help in the global fight against COVID-19. Another positively affected field within the broad spectrum of possible AI applications is in communication. Remote collaboration tools like Microsoft Teams supported communication in this challenging social distancing reality. Nevertheless, investments and developments in several other fields related to AI have been impacted negatively by the pandemic. This article describes the Japanese AI approach in a new world.
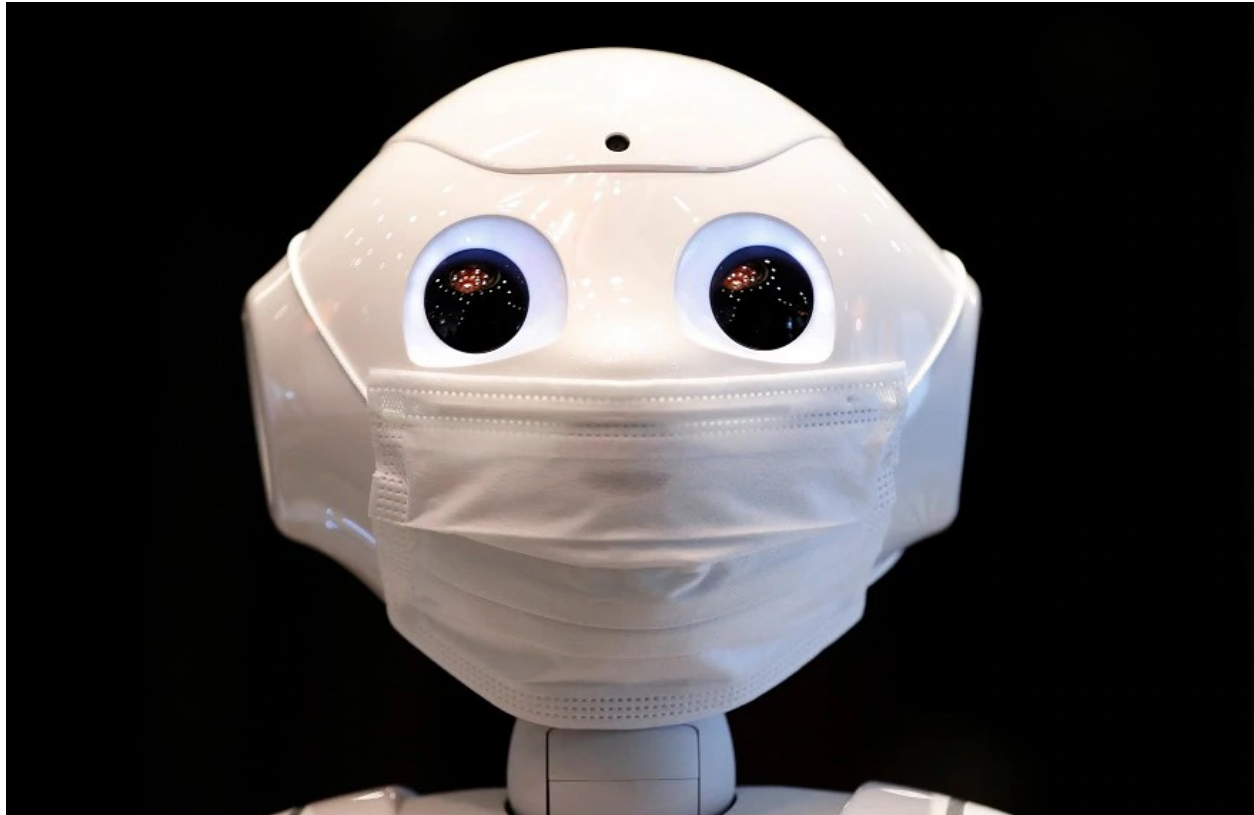
This AI robot, or 'Pepper', supports patients during the COVID-19 outbreak in Tokyo   Source: Reuters 2020

The Japanese AI strategy

The Japanese government has three priority areas as part of the roadmap for AI integration in society. The first is *Productivity*, focusing on an AI-integrated supply chain, predicting and matching the needs of consumers. One goal is the mass utilization of autonomous robots for a reliable production tailored to consumer demands, to provide the amount they need on the moment they need, aiming for a zero-waste society. The second priority area is *Health, Medical care and Welfare*. In this future, nursing robots will function as family-like members, providing services and nursing care. One of its goals is to enable designing your own body, replacing body functions by artificial organs and sensors. The third area is the integration of AI in *Mobility,* which would enable everyone and anything to travel freely, safely and environmentally friendly in the physical and virtual space. From decreasing accidents by autonomous transportation or minimizing the need of transportation altogether, the Japanese government is working towards a future where the cyber and physical space are fused together. Examples of virtual mobility are virtual tourism or virtual office spaces (SCAIT, 2017).

THE ROLE OF AI IN JAPAN`S SOCIETY 5.0

Japan aims to stay a prominent player in the high-tech and consumer electronics sector using Artificial Intelligence as one of its core technologies. Here, AI is defined as: *'Machines that are able to learn, reason, and act for themselves.'*, also known as Artificial Narrow Intelligence (ANI). This ambition is combined with the future society vision of the Japanese government called Society 5.0. Society 5.0 describes a society that is heavily supported by digital technologies, addressing its (current) societal issues, for example the aging society   and natural disasters like flooding, typhoons, landslides, and earthquakes. With AI technology, Society 5.0 wants to meet the specific needs of each individual (Kuczynska, 2019). This vision forms the northern star for Japan`s mid-term to long-term plans, such as the R&D plan, Innovation Strategy and, amongst others, Japan`s AI strategy for the coming 10 years that describes three priority areas to integrate AI in daily life (see text box).

COVID-19 AS INHIBITOR OF AI DEVELOPMENT

Looking at the negative impact of COVID-19 on the implementation of Japan`s AI strategy, the priority areas Productivity and Mobility can be expected to be affected the most. The current uncertain situation is combined with a near standstill of international trade (in physical goods). Border restrictions and ambiguous supply chains, have huge and lasting negative effects on the global economy, impacting production and consumption.

Although the recent economic forecast of Japan has somewhat improved after lifting the state of emergency at the end of May, gradually increasing socio-economic activities, the current spike of infections could create a setback (Cabinet Office, 2020). The Japanese Cabinet Office announced a 3.4% GDP decrease for the first quarter of the year, a 6% decrease in export, 0.5% decrease of corporate investment and 0.7% decrease of personal consumer investments (Nagata, 2020). The number of employees who were laid off increased by 4.52 million in April to 6.52 million in June (Cabinet Office, 2020).

Looking at the long-term projections, while being a wealthy country, the 6th most competitive country in the world, and part of the G7, Japan is expected to have a slow economic recovery and projected to reach the 2019 output level once again only by the end of 2024 (EIU, 2020). This could be the largest economic decline since recording began and exceed the 2008 global financial crisis (Keiko, 2020). Although Japan`s neatly planned AI strategy from 2020 to 2030 is developed with relative stable long-term developments in mind, it becomes clear that

due to the pandemic the context in which AI will be implemented in Japan has changed.

So how does this impact the Japanese AI market? Firstly, the decrease in corporate and consumer spending's gives a clue. During a crisis it is likely that luxury goods will be least prioritized by consumers living through a recession in an unstable economy. Related to this are the developments within the Productivity pillar of personalized or 'luxury' AI experiences, which are currently relatively expensive for the average consumer. Further developments of AI in personalized systems or AI supporting personalization and 'tailor made' consumer goods, could be delayed until the economic situation has somewhat recovered. For example, it is unlikely that we will see the normalization of a non-medical robot butlers affordable for the average consumer within the coming years.

Secondly, the Mobility pillar exists of two components: a physical and a virtual part. The automotive sector, key in the physical part of the Mobility pillar, as well as one of the Japanese world-class industrial sectors and Japan's largest R&D investor (Greimel, 2019) has weakened. The automotive sector's production and the export of transport equipment has decreased due to COVID-19 (Cabinet Office, 2020). While AI supported self-driving cars did not seem too far out of reach at the beginning of this year, the COVID-19 outbreak has affected investments, developments and interest. In other words, looking at short-term forecasts, the pandemic has negatively affected the transport sector and Mobility pillar of the AI strategy.

However, the crisis has provoked sectors to re-examine their medium-and long-term plans. It is not unlikely that in the long-run COVID-19's effect on the automotive industry can also inspire AI implementation for data management and autonomous driving technology to support the health and safety of its drivers (PWC, 2020).

POSITIVE IMPACT ON AI DEVELOPMENTS

Although most will think negatively about the impact of COVID-19 on the world's economy, ICT-related exports from Japan showed growth due to a strong demand for 5G and data centers (Cabinet Office, 2020). The possibilities provided by a broad spectrum of AI technology has increased interests as well. The Japanese government is currently planning to invest its R&D budget faster in the core technologies supporting Society 5.0, among which is AI. If you compare these developments to the AI strategy, it implies that the virtual part of the Mobility pillar, e.g. communication, and the Health, Medical care and Welfare pillar are stimulated. As the latter will be described in the next paragraph, the virtual mobility and communication aspects of the AI developments are being described here.

The first area of AI integration in society is telework. Despite the support from the government to normalize tele-working to reduce the strain on traffic over the past year, Japanese businesses have been reluctant toward teleworking (see textbox). The pandemic demanded a reinvention of the employees' home condition to adapt to teleworking, (re) introducing us to several (new) com-munication tools, supporting the ambitions of virtual mobility part of the AI strategy. AI plays a role as an enhancing and translating technology to improve

> **Teleworking in Japan**
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> According to The Japanese Business Federation, 97,8% of its member have instituted teleworking measures this year. This is a remarkable increase compared to the 29,2% in 2019 (Martin, 2020). Despite this increase, it remains important within the Japanese business culture to physically show your work rather than the work output. The homeworking conditions do not inspire either. For example, 99% of the apartments built in Tokyo are less than 100m^2 (Inamar, 2020), with an average of 64.5m^2 (MILT, 2020). If the pandemic can change the cultural and housing conditions as well, remains to be seen.

online communication tools. It can for example recognize background noises like a vacuum cleaner and filter this out in the conversation through machine learning (Protalinski, 2020).

Another development helping the integration of AI in society is the lowering of regulatory hurdles. To maintain social distance, many analog ways of working had to go digital, boosting digital initiatives to be adopted like telemedicine and remote education. The necessity to allow digital alternatives gives potential for AI embedded technology the communication, safety and consumer experiences.

AI COVID-19 SOLUTIONS

In this new world, in which humans need to adapt to a new way of living, AI can provide smart solutions for new problems. This brings us to the second priority area of the AI strategy in Japan: *Health, Medical care and Welfare.* AI plays an important part in our fight against COVID-19. By use of AI anomalies can be detected, infection probability can be calculated, inform, personalized content can be analyzed and false information spread on social media countered. AI can also be used to support economic recovery, monitored by satellites, GPS and social media data. Last but not least, AI plays a fundamental role in our ongoing search for a vaccine by predicting old and new drugs treatments (OECD, 2020). Several of these AI application areas are developed in Japan.

Sushi meets AI

Due to the COVID-19 travel restrictions, fish merchants around the world have trouble visiting suppliers of tuna for quality checks. Fortunately, the Japanese Shimura invented a solution for an industry relying on local expertise: The Tuna Scope. A deep learning algorithm collects grading data from merchants and unified a grading standard to ensure high quality fish. The merchant's smartphone scans a tray of tuna and provides within a few seconds quality results, ensuring delicious sushi.
(Kelly, 2020)

Tourism meets AI

The pandemic has put a halt to the Tokyo 2020 Olympic Games, international tourism and lowered domestic tourism dramatically. The Japanese company Ebilab has developed a service for the city of Ise, providing a virtual reality tour which takes tourists on simulated excursions to the Ise shrine. To make your virtual holiday complete, you can virtually shop at Ise's souvenir store and interact with employees by web camera.
(Tsukimori, 2020)

To start with what Japan is best known for: developing autonomous robots. Mirai's newest invention can drive through public spaces like malls or airports to detect people with fever. It then isolates the infected person and, if necessary, startup a tele-conference with a doctor. The AI technology makes the autonomous navigation, detection and interaction possible (European Commission, 2020). Another COVID-19 countering application comes from Fujitsu that introduced an AI handwashing monitor. It stimulates employees from health care, hotel and food industries to follow the health ministry's six-step hand-washing procedure by recognizing complex hand movements, which can even detect if people use soap (The Japanese Times, 2020). A solution for our personal inconvenience when facial recognition technology fails to identify masked faces is provided by Glory Ltd. Its technology is capable of distinguishing faces covered by masks (NIN, 2020). A final glimpse of the first steps in the Society 5.0 perceived future is Tokyo's robot hotel taking in patients infected with the virus (NOS, 2020). This practical application of AI equipped robots can assist or even replace care workers, especially in situation with a high infection risk.

All these developments show that this pandemic is more than a solely discouraging situation. The chaos has sparked innovative ideas, boosted new creatives initiatives and practical AI solutions to overcome this global enemy.

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This article has been written as part of a broader research report into AI developments in Japan, its market, actors and social impact. The publication of the full report is expected Autumn 2020.

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