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**SRI LANKA**

## **AmCham Sri Lanka Knowledge Hub Series: The Bulletin Board – Topic-in-Focus**

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## Artificial Intelligence and Automation in a Post-Pandemic World

By Dr. Romesh Ranawana

***The Pandemic has left most companies at a standstill. Many who survive will look at automation to prevent this from happening again.***

The COVID-19 pandemic has shown-up the weakest link in our society - people. Governments and corporates are struggling to keep things going with social distancing and work-from-home programs being enforced. Very few organizations are setup to operate remotely. Only a few types of organizations like technology companies have managed to maintain a modicum of operation during this unprecedented crisis. Critical services like manufacturing, agriculture, logistics and security have been severely impacted, and in most cases, ceased to operate for the duration of lockdowns. These problems stem from the total reliance on people to handle the day-to-day tasks needed to keep the operations running. This has resulted in many organizations contemplating drastic cost reductions, and in many cases, even closure.



**FIGURE 1. THE WORLD IN LOCKDOWN**

The need for social separation and minimizing human contact will continue long after the initial set of lockdowns are complete. Most organizations will still have to operate under a different environment to minimize interaction between their staff. This poses many problems

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for companies where people have to work together in large groups. Companies with some sort of automation in their processes will find it far easier to bring their operations online. The need for automation will be felt by those who rely solely on people to handle their day-to-day operations.

The need for greater use of technology and automation is also evident in how countries are dealing with the pandemic and recommencing work after long lockdowns. China, South Korea and Taiwan used technology extensively for automated contact tracing and for individually categorizing the level of risk for each citizen. These countries dealt with the pandemic most efficiently and are able to commence work with the least amount of disruption. Automation has also allowed them to disinfect and clean areas faster and safer, thereby allowing normal life to resume faster.

Technology and automation allowed these economies to react quickly, and thereby offer greater freedom for their citizens. There is a view among economists that investments in new technology will slow due to the economic crisis. However, history has shown us that investments in technology which push the boundaries, especially when they solve a key problem, accelerate during times of crisis.

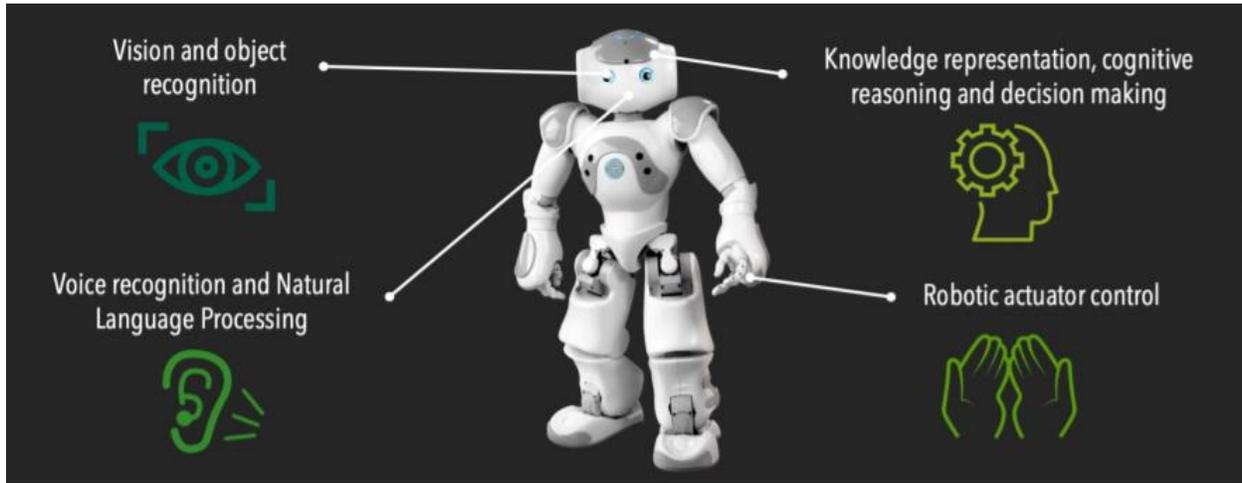
The technology to automate many industries are available. The economic realities of a post-pandemic world will most likely lead to a more concerted effort to utilize these recent technological advancements to solve some of the pressing problems faced by these organizations.

Overall, industries will look at what they can do to mitigate the impact of emergencies, whether they are pandemics, natural disasters or tariff wars. Industries want to be able to operate regardless of the situation, and therefore are forced into looking at ways where they can operate within minimal human interaction. Focus on automation is inevitable.

This article looks at some of the recent advances in technology and how they apply to different industries. The next section focuses on some of the technological tools available for automation and digitization. We then take a look at some of the industries which will take a harder and more concerted look at the available technology to solve some of the problems they encountered during the pandemic.

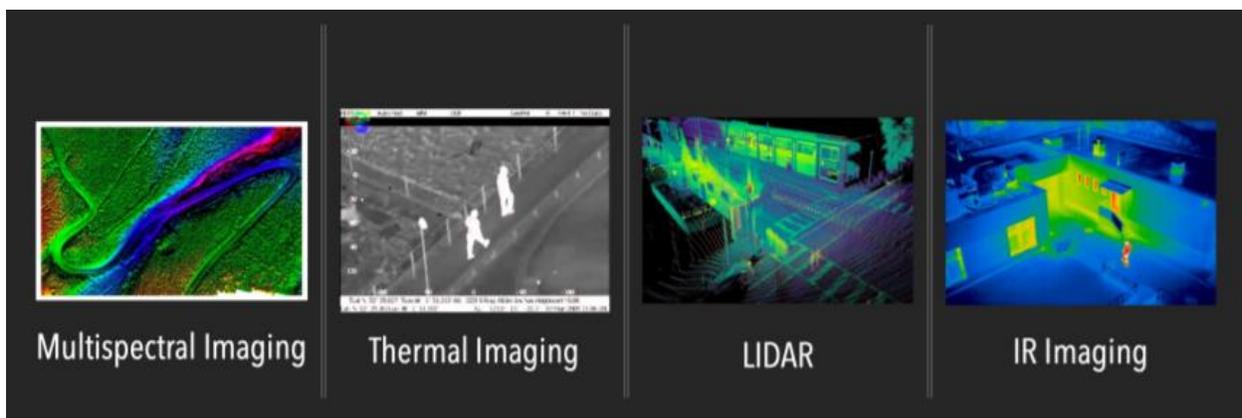
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## Technological advancements are the catalyst for greater automation



**FIGURE 2. REPLICATING HUMAN CAPABILITIES USING ARTIFICIAL INTELLIGENCE**

Recent developments in computing, artificial intelligence, data science and cloud computing offer a whole host of opportunities to build automation technology. Artificial intelligence allows us to build systems which can see and recognize objects like a human and to hear sounds and interpret them like a human (Figure 2). Advanced sensing technologies like multi-spectral imaging, LIDAR and thermal imaging allow these systems to see and interpret much more than an average human being (Figure 3). The cognitive abilities of Artificial Intelligence systems are well documented. Examples include the AlphaGo project by DeepMind which has shown that artificial intelligence-based systems can be built to outperform humans in specialized cognitive tasks. Similar examples of artificial intelligence outperforming human experts in cognitive tasks are available in engineering, medicine, finance and manufacturing.



**FIGURE 3. MACHINES CAN SENSE BETTER THAN HUMANS**

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The basic principles of artificial intelligence and machine learning were developed over 60 years ago. Adoption of the technology was however been slow due to the enormous computing resources needed to run even a simple system. These systems also relied on large amounts of data for training, which was often not readily available. All these problems have been mitigated over the past couple of decades.

First, digitization has led to large amounts of data being generated. Secondly, advances in computer hardware have made machine learning hardware cheaper, more reliable and smaller. Cloud computing also offers a way to build machine learning systems with unlimited processing capability. Advances in IoT and mobile data communication have allowed electronic devices on the field to connect-to and run their software in-real-time on these cloud systems. Mobile and cloud computing offers the framework for building systems which can collaborate with each other in real-time autonomously.



**FIGURE 4. AUTOMATION PLATFORMS**

All these technical advancements allow systems with advanced electronics, sensors and actuators to be connected and controlled in real-time by cloud systems (Figure 4). The cloud systems can execute advanced artificial intelligence and data science modules to analyze the data in real-time and execute actions.

The ability to replicate human abilities in technology opens up a new avenue in the types of applications which can be built. A discussed, technology can be enhanced beyond human capabilities in the form of advanced sensory capabilities and mounted on different deployment platforms.

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This means that applications can be engineered from the ground up to perform tasks which were previously done by humans. These machines can do more than humans, faster and for longer durations. The ability replicate and scale technology once they are built offers an advantage that humans cannot match.

We can now automate almost any sort of human activity or task. This is applicable to the entire spectrum of the types of jobs, although at different levels of intensity. For example, repetitive and manual jobs like food service and factory work can be automated quite easily. Similarly, cognitive work which is still repetitive, like front office and call center operations can also be automated using the tools available with machine learning. Nonrepetitive work is a bit harder to automate, but advances in cognitive computing is making building these systems much easier. Cognitive non-repetitive work like the work of doctors and engineers is harder to automate. However, the focus is not on fully automating these activities, but in automating parts of their job which is repetitive or heavily dependent on data.

## **Impact on Industry**

Automation will have a big impact on several industries. The following are some of the industries which will have the greatest interest in automation over the coming months.

### **Manufacturing**

Manufacturing is one of the industries most severely affected by the pandemic. Most manufacturing organizations rely on humans for a larger part of their operational flow. The way manufacturers handle logistics, supply chain, the movement of money, production and order fulfillment wasn't conducive to a situation where most of the people involved are not available. Most manufacturing companies will now look at automation of their operations, from production right through to supply chain fulfillment to ensure that this sort of problem does not occur again.

Digitization will play a key role in allowing this to happen. True digital transformation will allow companies to have real-time visibility on their supply chain, manufacturing and order fulfillment, and thereby, give them more ability to be flexible in times of crisis. True digitization also entails the ability gain insight from the data, thereby improve the way manufacturing is done. This requires greater emphasis on type of and quality of data which is collected, and the types of systems used to analyze it.

Greater emphasis on robotic manufacturing will result from the need to keep manufacturing operational even when a large proportion of the workforce is unavailable.

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Artificial Intelligence, big data and IoT can now be used to build powerful robots which can do these tasks faster and better than most humans. Manufacturing needs to adapt so that they can react to emergency situations better. The devastation caused by the pandemic will force many of these companies to adapt.

Adaptation will involve the automation of much of the processes of manufacturing so that production can continue regardless of the situation.

## **Logistics & Delivery**

The global crisis has led to greater demand for logistics and delivery systems. Demand is rising for everything from groceries to medicine. The scaling of these operations is difficult, especially when demand rises rapidly. Automation of logistics and delivery is a complex task and requires the development of a number of disparate sub-systems.

The technology to automate many of the processes are now available. Robots can be created for order fulfillment using a variety of methods. Many large companies like Amazon already have several facilities which are mostly automated. The difficulty lies in automating the delivery process.

The technology to deliver a package of almost any size automatically to any part of the world with no human intervention is available. The technology to do this using ground vehicles or drones is readily available. However, the inhibiting factor is regulation. Several countries have been working on regulation for autonomous vehicles. However, these programs have been slow to show results.

Companies which commenced work on autonomous delivery systems have slowed down development due to uncertainties of the regulations which will be imposed upon them.

The recent upturn in demand for delivery services has resulted in greater demand for automated and contactless deliveries. This could lead governments to accelerate regulatory approval for automated delivery services.

Delivery and logistics has been identified as a crucial industry when dealing with emergencies. Technology to ensure that they can continue unhindered during extreme circumstances is very important.

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## **Health**

The demand for systems which can autonomously and remotely monitor the health of individuals has never been higher. Wearable devices, connected onto smart devices and the internet can monitor a whole host of biometrics.

The technology to embed biometric advanced sensors in normal clothing is advancing at a rapid rate. These devices can be connected onto cloud enabled applications which can automatically monitor the wearers and alert relevant people whenever necessary. These devices will become more specialized with time, and cater to the specialized needs of target groups like elderly people or cancer patients. Robots are also an ideal technology for the safe handling of bio-material.

Robots can operate with millimeter precision and not spread germs. In addition to simple patient care for infected patients, these robots can be used for logistical tasks within hospitals to transport meals, medications or even bio-waste and garbage. Sanitization is also an ideal application for a smart robot. Automated sanitization systems are an ideal way to make sure that work environments are kept up to the standards necessary to protect workers.

The need for better healthcare and monitoring has never been more evident. Proving healthcare at the expected level is however extremely difficult due to logistical and personnel limitations. Preventive healthcare is the best way to lower costs. With an ever-increasing elderly population and limited budgets, it is becoming difficult to maintain the quality of healthcare. The automation of data collection and analytics in healthcare is an ideal way to mitigate these problems.

## **Retail**

Retail has been adversely affected by the pandemic. The ramifications of the lockdowns have been felt by both small and large retailers. Customer sentiment has already shifted to purchase of essential items like groceries over the internet. This has accelerated the automation of retail. Current and future needs for social distancing will only increase this trend.

Automation can be implemented for all levels of retail. Automated kiosks will gain more popularity. Checkout functions will continue to be automated. Labour intensive tasks in retail like stacking and packing are tasks which are easy to automate. Even though the technology for automating most retail functions is available, the development and deployment of the technology can be costly, time consuming and risky. The problems caused by the pandemic maybe the catalyst to force companies into greater adoption of automation.

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## **Security**

Security and surveillance has been adversely affected by the pandemic due to the heavy reliance on people. This includes operations for security forces and police, and the security of industrial sites and offices.

Artificial Intelligence can be used to automate many of the tasks conducted during security and surveillance. This includes the monitoring of sensor feeds like CCTV cameras and motions sensors for activity, or more advanced surveillance using mobile platforms like rovers and drones. Artificial intelligence modules can be developed to not only detect people, but also recognize individuals and what they are doing. These systems can run around the clock and alert remote personnel when an event of interest occurs. Remote access allows security personnel to access and control the devices from the safety of their homes.

The value of big data in security operations has been evident by how countries like South Korea and Taiwan have dealt with the pandemic.

## **Agriculture**

Agriculture is one of the industries most severely affected by the pandemic. Crops are grown over tightly controlled processes, and need to be fertilized, watered and harvested at the correct time. Any change to the desired schedule can have an adverse effect on the crop. The loss of a harvest not only affects the farmer, but can also have an adverse impact on society in general if crops fail on a large scale. The demand for food does not change during emergencies. Automation of agriculture will therefore become a priority for many communities.

Work on automating agricultural processes has been on-going for many decades. However, recent advances in artificial intelligence, big data and robotics allows us to automate tasks that were difficult to automate using older technology. Ground rovers and drones are now being used for planting, watering, spraying insecticide and fertilizer, and harvesting. These machines also use advanced sensors to monitor the crops and their growth. Big data analytical techniques can then be applied to this data to forecast crop yields and to optimize operations like fertilizing and watering the maximize the crop yield.

Ensuring that food production can continue during emergencies is a crucial. The limitations of the systems identified during the pandemic will certainly force many countries and companies to look at automating a large proportion of their farming systems.

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## **Focus on Automation will Intensify**

Many efforts to automate processes have gotten lost in pilot programs and prototypes. Many attempts at automation have not returned the expected improvements in performance. The post-pandemic world will however force these same companies to approach this with more focus. Companies will be forced into adapting fast and automating their processes. Some companies will have to choose but to automate if they are to survive.

Those companies that automate better and faster will have an advantage over their competition. In addition to providing them cover during emergencies, these companies will over-shadow their competition in terms of cost, speed and scalability of their operations. Companies which digitize and automate will have more flexibility and react better to unforeseen situations. Automation and digitization allow organizations to react quickly to emergencies, and to rapidly change the way that they work so that productivity is not compromised.

Automation is difficult, and is why many are wary of it. However, those who move fast and build systems which truly make a difference will come out of this period the best. The technology is ready, and only needs dedication and focus to start making a significant impact.



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