

Original Article

# Robotic Process Automation - The Ineluctable Virtual Workforce in Various Business Sectors: Post Covid-19 Scenario

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**Abstract** - Covid – 19 is a sudden unexpected jolt on the functioning of every sector's day-to-day work and dragged everybody to find the best alternative for the automation of processes to enable more work from home. Robotic Process Automation (RPA) is one of such promising technologies which would help in the automation of mundane everyday tasks. With this technology, software robots would be deployed to perform the repetitive tasks done by humans in various sectors. This technology is also sometimes termed software robotics. In this paper, we have studied and discussed about the different tools used for developing software robots, traditional methods of completing the task without RPA being used and also how the task is automated after the use of software robots in various fields, viz., banking, e-commerce, educational institutions, human resources, health care and office. We have also discussed the pros and cons of automating the task using robotic process automation. In short, this paper will give an overview of the emerging technology – RPA.

**Keywords** - Artificial Intelligence, Business Process Automation, Business Process Management, Robotic Process Automation, Machine Learning, Soft Automation.

## 1. Introduction

### 1.1. Robotic Process Automation

The term Robotic Process Automation (RPA) is often very misleading. When most people hear the term, they envision a physical robot wandering around in a local environment and completing tasks that were previously done by humans [89]. Instead, there will be software robots designed which would mimic human activities [9]. RPA is one of the emerging technologies that has already been adopted in a few sectors and will soon make its way into many other sectors. The exact inference of RPA is shown in figure 1.

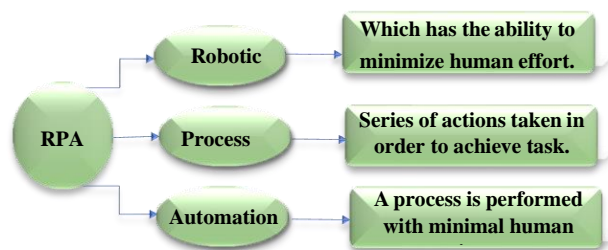


Fig. 1 Robotic Process Automation [15]

The main feature of Robotic Process Automation is that with the RPA framework, one application (software robot) interacts with another application not through the API (Application Programming Interface) or the integration bus but through the existing user interface. As a result, one programme communicates with another programme in the same way that a typical user would [88].

As RPA begins to handle unplanned situations and deal with unstructured data, incorporating artificial intelligence (AI) and Cognitive Automation components into RPA tools makes it even more efficient.

#### 1.1.1. Robot

A robot is an artificially controlled computer that substitutes human effort, despite the fact that it does not look like humans or execute tasks in a humanlike manner [9,51]. People usually have a misconception that a robot can only be an electromechanical device which would help automate the work done manually, such as an industrial robot. This is not always true; a robot can also be software which could be designed and deployed to complete the assigned task once



programmed to do so. A software robot records the actions the human performs and is capable of doing the same tirelessly with high efficiency [47] unless instructed to stop [49]. Artificial Intelligence and Machine Learning play an integral role in the functioning of a robot. A simplified model of AI/Robots is shown in figure 2. A smart robot must possess artificial intelligence that allows it to distinguish itself from other machines. It should not give the same output always. A change in the input should cause some change in the output [23], and the robot should also possess the following qualities.

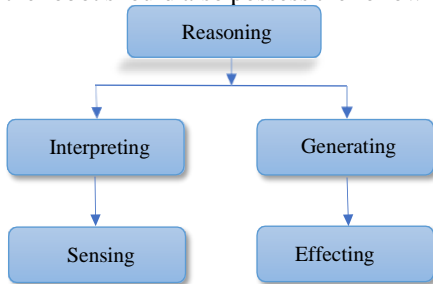


Fig. 2 Simplified model of AI/Robotics [16]

In Isaac Asimov's science-fiction story Run-around, the term "robotics" first appeared (1942). It established a new level of plausibility, along with Asimov's later robot tales, about the possible challenge of creating intelligent robots and the resulting technological and social problems. Asimov's popular Three Laws of Robotics were also included in Run-around:

1. A robot does not injure a human being or cause a human being to come to harm due to its inaction.
2. Except where certain orders clash with the First Rule, a robot must follow the orders given to it by humans.
3. A robot must defend its own life as long as this does not contradict the First or Second Laws [51].

#### 1.1.2. Process

The process is a very familiar term and is used almost every day. It can be defined as accomplishing an assigned task by following a sequence of operations [9]. A human or a machine, or a combination of the two, can complete a process. It completely depends on the process which is going to take place. Whether it is a closed or open system, the method accepts feedback from various devices or people and completes work according to predefined rules to achieve the desired result [32]. For example, let us consider a CNC machine where after loading the workpiece, input is given to the machine in the form of G-codes and M-codes to perform the required operations on the workpiece to obtain the desired machining operation in the form of output.

Process mining enables users to quickly and easily understand the maturity of business processes and helps recognize automation opportunities. It streamlines processes which help accelerate the implementation of RPA and reduce the time [40] and cost involved in training a robot [87].

#### 1.1.3. Automation

Automation is something that can be seen in all the processes taking place in today's world. It is a technique for automating a procedure without the interference of humans. Automation, also known as automated control, uses multiple control systems to operate machines, factory processes, boilers, and heat-treating ovens with little human interference. Today the world is moving towards automation of all possible operations. Scientists are working towards automating the tedious processes so that the human brain and their efforts can be utilized more effectively and are not involved in doing boring and repetitive work [46,55]. There is a huge possibility that almost all the work in the near future will be automated, and humans will be required to do more productive jobs [15].

Before automating any task, it is critical to understand the nature of human work, and the software should be designed in close collaboration with the workers for whom it is intended [10].

Automation may not always mean automating the existing processes using new technology. Processes during automation can be simplified as much as possible, and then automate the part which cannot be simplified [59,78].

Automation can be broadly classified into two categories, i.e., Hard Automation (fixed automation) and Soft Automation (flexible automation). In hard automation, the machine is restricted to performing only one task and cannot be re-programmed, whereas, in soft automation, the robot can be re-programmed [41]. RPA comes under soft automation [24]. It uses software robots to automate human activities [40]. These robots use software with artificial intelligence (AI) and machine learning (ML) capabilities to automate the tedious and repetitive tasks which were earlier done manually [4]. This technology is generally used when there is high volume and monotonous work to be automated.

#### Types of Robotic Process Automation

Rule-based robots, knowledge-based robots, and learning-based robots are the three types of robots that RPA technology is commonly used to build.

##### i) Rule-based

Rule-based software robots are known as "Probots", which repeatedly apply predefined rules to process the data [21].

##### ii) Knowledge-based

Knowledge-based software robots, usually called as "Knowbots", search for user-specified information across the internet and stores them [21].

##### iii) Learning-based

Technology that is focused on learning. Robots can use machine learning methods to learn their functions from given data [21,70].

**Table 1. Feature-Based Comparative Study [24]**

Parameters	Ui Path	Blue Prism	Automation Anywhere
Visual Process Designer	Yes	Yes	Yes, but it is more script based
Openness of the Platform	Yes, it has free forums and tutorials	Yes, but all the forums are commercial	Yes, but all the forums are commercial
Macro Recorder for Process Mapping	Yes	No, due to their rather outdated technology	Yes
Control through coding	No	Yes	Yes
Execution of Automated Test Cases on Remote Machines	No	No	Yes
Future Scope	Indefinite	Comparatively less	Comparatively less

## 2. RPA Tools

RPA tools are available softwares that will aid in training and deploying software robots. Software robots are also termed bots sometimes. These tools can read data from one program and enter it into another [33], allowing integration without the need for expensive interfaces or software changes [49]. Many RPA tools are available in the market, such as automation Anywhere, Ui Path, Blue Prism, Antworks, NICE, Kofax, Kryon, Pega Systems, Thoughtonomy, and Workfusion [60]. Any chosen RPA tool can be used to automate the work in different sectors. Among all these softwares, Ui Path, Automation Anywhere and Blue Prism are the softwares which are widely used.

### 2.1. Ui Path

Ui Path was founded in the year 2005. It was earlier an outsourcing company. Later when they realized the need for robotic process automation in the market, they developed software and launched it in the market. It is open-source software that can be downloaded by anyone and can be used to automate tasks in various fields. It can be used for a wide range of tasks, including document management, call centre operations, healthcare, financial services, data extraction and migration, process automation, and API integration [24].

### 2.2. Automation Anywhere

Automation Anywhere is a developer of robotic process automation. It was founded in the year 2003 by Ankur Kothari, Mihir Shukla, Neeti Mehta Shukla and Rushab Parmani and was named Tethys Solutions, LLC. In the year 2010, the company was rebranded as Automation Anywhere, Inc. The products of this company are designed to allow the execution of automated business and IT processes through multiple devices, taking into account differences in systems, application loading times, and Internet speeds [24]. It employs software robots to complete business processes. It can be used in different sectors to complete the assigned task. Recently, during the outbreak of Covid-19, this software is being used to train robots and deploy them to monitor the oxygen supply in NHS hospitals United Kingdom [68].

### 2.3. Blue Prism

A group of process automation experts founded Blue Prism in the year 2001. Their mission was to create technology that would help companies increase their productivity and effectiveness. Their primary focus was on white-collar back-office work, where they saw a huge unmet need for automation [24]. A comparative study of the three popular RPA tools shows that all three tools can be used for automating the back office processes. However, only Ui Path and Automation Anywhere can be used to automate the front office jobs. Moreover, when we compare these tools based on their features, we end up with the following table, which shows that Ui Path would be the best software for automating the processes.

## 3. Conventional Work Processes – COVID-19 Challenges

The traditional work process includes all the blue-collar and white-collar jobs done manually. This had a few disadvantages because they were all subjected to human errors. For example, there were many typo errors, inaccuracies, typing in the wrong place, more time consumption for completing a particular task etc., [14]. Further, the Covid – 19 disaster made all the work processes be completed successfully without or less the involvement of humans.

The following sectors, which involve 80% of the conventional working processes involving humans, have become INEVITABLY digital during and post-covid – 19

1. E-Commerce
2. Banking
3. Office
4. Educational Institutions
5. Health Care

All these sectors are facing major challenges such as staffing shortages, enhanced online shopping, augmented door delivery requirements, increased usage without human involvement, working from homes, learning from homes and everything in health care.

## 4. Implementation of RPA – An Inevitable Solution

### 4.1. E-Commerce

With the rise of e-commerce, RPA has become an essential component of the modern retail industry, improving back-office operations and customer experience [77]. In the E-Commerce sector, RPA can be used to calculate the most frequent transaction performed, to check the number of users who logged in to the website on a particular day, to check at what time of the day the count of users was the highest, to check what was the highest duration of time a customer used their website. Once all of the customer data has been retrieved, it can be organised in a structured manner using the RPA tool for the website owner's convenience [1]. This would help him by giving him an idea of how his business is running if he is earning profits or he is in loss [13]. It will help him by giving him cognizance if there are any changes that are to be made. If the count of users is high at some time of the day and the application is not working effectively, then the owner would make sure to fix things so that the customers do not face any difficulty.

The robot can be used to decide the method of posting on an e-commerce website. The basic idea behind these applets is that when an email tagged with a specific hashtag is sent to a particular email id (for example: trigger@applet.ifttt.com). Content in the body of the email would be posted on the specific social media platform related to that specific hashtag [2].

Once the bot is configured to perform a particular task, for example, gathering information about a mobile phone from a given e-commerce website, then when we just enter the name of the mobile phone, the software robot performs data scrapping and gathers all the information about the particular mobile such as its year of manufacture, cost, front and rear camera resolution, battery backup, etc., puts it into an excel sheet and mails it to the customer [3].

### 4.2. Banking

The banking sector is one of the most important sectors. Here, there will be many transactions taking place on a daily basis. Business process automation (BPA) is characterised as the use of advanced technologies to automate complex business processes and functions beyond traditional data manipulation and record-keeping activities [4,90]. RPA is implemented to improve the customer experience, reduce cost[47], and also the time involved in maintaining and carrying out activities [20], increase performance efficiency and stay competitive [7]. Software robots can be used for maintaining records and managing transactions. They can also be used for the purpose of data entry[33] and making necessary corrections [13]. Banks are integrating the web, touch voice, artificial intelligence, and other technologies to improve customer service using social robots [8].

Using RPA in the banking sector would help by detecting fraudulent activities and maintaining sophisticated levels of security. The KYC of the customer can be processed with the help of software robots. It provides excellent consistency while performing the assigned task. It reduces the manual work of keeping track of changes made and updating them, and we can get quicker and easier results [5].

A chatbot is a bot designed to enhance customer experience [76]. It can handle regular transactions as well as basic customer inquiries such as "where is X on the website?" "How do I reset my password?" and other similar inquiries. RPA tools are not intended to replace existing business applications; they simplify human workers' already manual activities [4].

The robotic arm used in ICICI bank smart vault is also based on RPA. This automated robotic arm locker can be used so that the chance of theft will be minimized. This robotic arm will get the locker to the customer when instructed to do so. When the customer has completed the work, the robot will again keep the locker in its place. There will be very less chance of inaccuracies as the robot is programmed to perform a particular task. An automated locker is very useful as it will be convenient to reach out at any time of the day [8].

### 4.3. Office

During the chaotic period of Covid-19, everybody is doing their part and trying to do everything possible to keep the economy from going off the rails [55]. This sector provides employment to a large group of the population in our society. So, the efficiency with which the work is done has to be very high. The employer has to maintain a balance between the completion of work and employee satisfaction [53]. Robotic Process Automation would be a good method to leverage between these things. It can be an excellent method to maintain productivity during both good as well as turbulent times as it minimizes the dependence on employees [54]. The bots are usually deployed to do the back office or blue-collar jobs in the office. However, they are trying to automate even white-collar jobs[44]. Years of back office research have shown that low-performing back office jobs can be transformed into high-performing back office jobs by implementing six transformation levers: centralise physical facilities and budgets, standardise processes across business units, optimise processes to reduce errors and waste, relocate from high-cost to low-cost destinations, enabling technology with, for example, self-service portals, and automate services [57].

Before building a robot, we should ensure that the robot is really necessary for the present working environment[22,58]. This can be done by checking the following things.

1. Departments in the company which consistently underperform

Check if the following things are affecting the performance of the department:

- a) Time required to access data across various applications
- b) Manual data entry time
- c) Excessive approval time
2. Appraise the inter-departmental information flow
3. Evaluate the stability of business-check which processes are suitable for automation
4. To estimate the cost of errors
5. Find out the level of employee satisfaction
6. Access the number of manual tasks that the employee performs [53]

Once the above-mentioned things are checked, and they feel that a software bot is to be deployed for automating the task, then they can be deployed for the automation of the administrative work as it takes a lot of time to complete them. The quality of work has to be good [15]. The bots can be used for processing insurance claims and following up on clients by sending them emails [53]. Apart from this, they can also be used to maintain details of employees working in the organization, processing customer orders, process requests by email, process salaries, update client profiles, and process exceptions [14].

In an office, the bot can also be trained to automate the tasks in the HR department. They can be used to search for candidates with a similar profile to the advertised requirement on networking websites. It can automatically reject job applications that do not satisfy the requirements. It sends an automated email to the candidate about the reason for rejection and the skills the company is looking for in the applicants, creates a database of all the candidates for future reference and notifies them when there is a job opening which suits their profile [52]. The data of a person working for one organisation can be easily transferred to another organisation with which he or she will work in the future using RPA[48].

In telecommunication, an industry bot is designed for processing orders, sim swapping, ID generation, customer reassignment, solving customer disputes and maintaining records [18]. The bot can also be designed for auditing, where it will be responsible for auditing tasks such as reconciliations, internal control testing, and detail testing [19].

After the bot is configured and has started working, then it is important to check if the bot is working satisfactorily for the job it has been designed for and is worth the investment made. This can be done by calculating the cost-performance ratio. RPA's efficiency is unacceptable if the measured cost-performance ratio is less than the lower bound. RPA's efficiency is acceptable if it is greater than the lower bound and less than the upper bound and is outstanding if it reaches the upper bound [11].

#### 4.4. Educational Institutions

In educational institutions, software robots can be used for accumulating data from different spreadsheets into one, calculating the percentage the students secured, and then creating and updating records [24,26]. Work in finance and administration departments for admissions assistance, meeting scheduling, and other high-volume transactional tasks that require moving data within and between applications and keeping a record of attendance [26]. They can also be designed for predicting students' career paths, searching the portals and for self-checkout at libraries. RPA is beneficial as it uses smart algorithms to determine the teaching method that is likely to work for each of the students and is less biased in the grading system [28].

Intelligent tutoring systems that are highly personalised and adaptive to needs and external changes are provided by robotic process automation. It enables one-on-one interaction between tutor and student using artificial intelligence and machine learning.

The following work can be automated by using software robots in the education sector.

1. Scheduling academic board meetings
2. Managing students' enrollment
3. Planning educational events
4. Processing invoices [40]
5. Attendance Tracking
6. Report card processing [56]

#### 4.5. Health Care

Just like any other sector, using RPA in the healthcare sector is essential for it to be on par with other sectors where RPA is being used. Healthcare is predicted to have a 36% automation potential, meaning more than 1/3rd of the processes can be automated, allowing healthcare professionals sufficient time to assist patients [72]. RPA, when used in the healthcare sector, healthcare professionals will have access to information about all the patients [37] without even having to track large amounts of data manually [81].

In the healthcare sector, RPA is being used to track the inflow and outflow of funds to reduce errors and loss. It is being used for scheduling new patient appointments [64,35,36]. Whenever a new patient fills out an appointment request form, the robot scans the incoming data and directs it to the correct queue. The bot notifies the patients in case their appointment has been cancelled [69]. This technology also makes it easy to maintain the record of the patients and to provide them with tailored treatment [64].

During the Covid-19 pandemic, there has been a significant increase in patients requiring oxygen support. The supply of oxygen was not a challenge, but the real challenge was monitoring the supply. There were chances to note wrong readings, and the staff were engaged in it. So, in the NHS hospital, they built a software robot using the tool Automation

Anywhere which would monitor the oxygen supply and make a record of it [68]. Apart from this, the tool is being used to amalgamate data about clinical trials of drugs from various sources to speed up the process of documenting information [74].

The NHS also had to process a lot of tests every day, and before processing each of the tests, form E28 was to be filled. Filling them manually is a tedious and time-consuming task, but it can easily be done when automated. Sending the data to the WHO became easy by doing so [66].

Apart from this, the software robot can be trained for the management of insurance claims, i.e., it aids in the completion of insurance records, automation and speeding up of enrolment, processing of claims, structuring of medical data (data extraction, file classification), analysing medical records, using keywords to extract data, identifying structured and unstructured data, and comparing it to historical health records [69].

The healthcare industry is always searching for ways to improve efficacy and cut costs, and RPA will help them do so in a short period of time. It helps to check the availability of physicians or specialists in the hospital. It can also be used for inter-hospital referrals and transfers by collaborating with other hospital applications. It is also possible to prepare a discharge report, approve it, create a pending payment bill, return expired medications and stationery, and settle the final bill [60].

During COVID-19 time, robots are being used in hospitals to gather information about patient's symptoms and direct them to the doctor's cabin. The information collected will be sent directly to the doctor using an application, and treatment can be provided [73]. Robots are also used to take orders from patients and serve food. Once the robot is programmed to do the task, it completes it without any error, and it also has the capability to detect hurdles on the way while transporting food [61] and medicines [38].

As society is moving towards progress, there is greater dependence on technology and new innovations. Since elderly people are not on par with the growing technology, robots are being used to help old people communicate with the young generation [61] by sending them text messages. The robot converts voice messages into text and sends them to the other person and vice versa. These days the number of elderly people living alone is tremendously increasing, and the number of them developing dementia is also increasing proportionately. Dementia can be cured when at early stages, robots have been designed which help detect the signs of dementia in elderly people [45].

About 80% of the billing and claims processing work was automated, thereby reducing the cost from \$4 to \$1 per claim

[73]. Less paperwork, a more productive workflow, and time-saving procedures would enable healthcare workers to focus on the job at hand, which is caring for their patients, rather than filling out paperwork.

RPA, which has many advantages when used in the healthcare sector, also has a few challenges, like speeding up the time required for the detection of data without compromising on the accuracy and using metadata so that the documents are not required to be opened many times in order to check for information [80].

## 5. Comparing RPA with Similar Technologies

### 5.1. RPA vs API

Application Programming Interface (API) is software which aids in communication between any two applications to obtain the desired result, Whereas Robotic Process Automation (RPA) uses RPA tools for the automation of any given process. API uses the back-end approach to get the job done, whereas RPA uses the front-end approach and performs all the activities sequentially, just like humans.

Considering time and cost, the cost of designing and developing an API is much higher when compared to RPA and is also time-consuming. However, designing and deploying an RPA robot is cheaper and less time-consuming [40]. The cost of maintenance and support is low for API. Initially, the support cost of RPA is high because of its potential to disrupt workflows and because it uses a front-end approach. However, this cost will decrease once new techniques are built for the organizations to automate front-end jobs.

Although there is a difference in the method of approach (front-end and back-end), a strategy which uses both technologies simultaneously will give the best result [82].

### 5.2. RPA vs Artificial Intelligence

Artificial Intelligence (AI) and Robotic Process Automation (RPA) are the two most popular technologies used by businesses today to improve customer satisfaction, boost employee morale, and lower operating costs. Artificial intelligence is using computer systems or devices to mimic human intelligence processes. These processes include comprehension, reasoning and self-correction. Chatbots, speech recognition, and computer vision are examples of popular AI applications.

RPA uses predefined rules and structured data, whereas AI uses unstructured input and develops its own logic and rules. A combination of the two can help in creating a completely autonomous process. RPA can automate processes when they are easy, but when the processes are complex, AI is used, which takes automation to a higher level [83]. It can handle the processes that could be done only by humans as it uses AI robots with cognitive abilities and large data sets to make decisions [84].

Autonomous actions, such as autonomous driving, are made possible using AI systems. The same is true in workplaces where humans and robots collaborate. Robotic Process Automation (RPA) incorporates artificial intelligence (AI) technologies into business process environments to improve decision-making intelligence, flexibility, and adaptability [65].

Turing's paper in the philosophy journal Mind in 1950 crystallised the concept of AI by laying out a process for determining a structure to determine the level of AI. The Turing test has become a standard protocol for determining how well AI can imitate humans. In 2014, an AI system persuaded more than 30% of judges that it was human, and it is predicted that computers will routinely pass the Turing test in the near future [50].

### 6. Advantages

The advantages of RPA are tabulated in table 2.

**Table 2. Advantages of RPA**

Benefit	Description
<b>Accuracy</b>	When the work is done manually, for it to be accurate, the person performing the task should be experienced enough to do it. This is not always possible. So, if the bots are trained to complete the task, they can do it accurately and tirelessly [9,25,83].
<b>Productivity</b>	The bots take much less time to complete the assigned task when compared to humans. Also, in a given span of time, a robot can complete more work when compared to humans [9,12,14,16].
<b>Improved Employee Morale</b>	With the use of software robots, employees can be engaged in more productive work that actually needs the human brain instead of the repetitive back-office work that can easily be automated [9,14,34].
<b>Reliability</b>	Robots can work 24/7, which is not possible for a human to do [9,16].
<b>Consistency</b>	The RPA robots are deployed to perform the task in the same way each time it is done [9,14,16,25,49].
<b>Low Technical barrier</b>	Usually, to train a robot, good programming skills are usually required, but to train an RPA robot, programming skills are not required. It can be done by anyone with the help of RPA tools [9].
<b>Reduced cost</b>	The cost involved in deploying a digital workforce is much less when compared to hiring humans to do the same job [9,12,14,16,25].
<b>Can be re-trained</b>	The robots can be trained again to do different tasks whenever there is a change in the work to be completed [12].
<b>Scalability</b>	The digital workforce is capable of taking care of the surges in client activities and deploying the robots accordingly [5].
<b>Faster speeds</b>	The robots are about 80 to 90% faster when compared to human employees [5,83].

### 7. Disadvantages

1. Although RPA aids in completing routine tasks more quickly and with greater accuracy, it also has the potential to make errors more quickly and with greater certainty, because there is no human check before the execution of a procedure [27,49].
2. Insufficient or wrong definitions of process rules can lead to errors. [49].
3. *Lack of technical ability*: There is usually a misconception that for using RPA, good programming skills are required, and due to this reason, a lot of people hold back from even attempting to use the new technology [16].
4. *Redundancy*: Another common fear is that robots will eventually replace human jobs [31] when their primary function is to assist humans in their work [6,16].

### 5.3. RPA vs BPM

BPM research has expanded in many directions over the last decade to support more flexible business processes, process mining, and case management applications [43]. Robotic Process Automation (RPA) and Business Process Management (BPM) have the same goal but with different implementation strategies. BPM is not just software but a method of organising business processes to maximise efficiency and value. It helps meticulously identify the areas that require improvement and build a solution to them.

RPA follows predefined rules to automate every process. It helps in the automation of repetitive tasks. When we know that a transformation is to be made and things are to be built from ground level to obtain better results, then BPM comes into the picture [85].

5. Robotic process automation tools are incapable of dealing with intricacies, errors, exceptions, or the normal disarray of human interactions [76].

### 8. Future Scope

In the future, banks will have robot advisors that will assist people in making sound financial decisions and discourage them from making bad ones [8].

According to Gartner, 60 percent of companies with more than \$1 billion in sales will use RPA software by the end of 2019. By the end of 2022, 85 percent of large and very large businesses will have implemented RPA in some way [17].



"Post Covid 19, as adoption rates rise and corporate organizations implement better business outcomes through this technology, such as cost reduction, accuracy improvement, and enforcement improvement, the average price of RPA will drop by 10%," Tornohm predicted. 15% of the total [17]."

Established car companies like Uber, and Ola, along with Google, are spending huge sums of money on research on machine vision and control; soon, AI is going to replace drivers with AI-driven cars [63].

The role of Digital Work Design (DWD) while introducing RPA for automating repetitive processes in the service industry [86].

In the future, software robots may no longer be rule-based, allowing them to self-reconfigure and build new software robots based on the experiences of those that have already been built [21].

#### Research questions

1. What characteristics make processes suitable to be supported by RPA?
2. How to let RPA agents learn? How do you coach RPA agents?
3. How to control RPA agents and avoid security, compliance, and economic risks?

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4. Who is responsible when an RPA agent "misbehaves"?
5. How can RPA agents and people seamlessly work together?[48]

#### Further Opportunities

1. Recognition of Facial Expressions
2. Tracking of the eyes
3. EEG (Electrical Activity in the Brain) Reading [29]

## 9. Conclusion

Post Covid -19 scenario opened an inevitable situation of functioning various tasks every day without human interaction, and digitalization is made compulsory. Robotic Process Automation is gaining traction these days due to its promising capabilities like cost saving, time reduction, employee and customer satisfaction and accuracy. It is being used in almost all major corporate organizations to automate back-end jobs and in almost all sectors. There are many automation tools available by comparing them, Ui Path is found to be the best. RPA alone can do the work efficiently, but combining it with other technologies like API, BPM, AI, etc., provides better results. With the use of AI, all the processes can be completed autonomously.

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