



# ROBOTIC PROCESS AUTOMATION AND ITS APPLICATIONS

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**Abstract:** Through the application of Robotic Process Automation (RPA) organizations aim to increase their operational efficiency. In RPA, robots, or 'bots' for short, represent software agents capable of interacting with software systems by mimicking user actions, thus alleviating the workload of the human workforce. RPA has already seen significant uptake in practice; solution technologies are offered by multiple vendors. Contrasting with this early practical adoption is the hitherto relative lack of attention to RPA in the academic literature. Consequently, RPA lacks the sound theoretical foundations that allow for objective reasoning around its application and development. This, in turn, hinders initiatives for achieving meaningful advances in the field. This paper presents a structured literature review that identifies a few contemporary, RPA related themes and challenges for future research.

**Index Terms – Robotic Process Automation, Bot technology, software Bot, tools.**

## I. INTRODUCTION

Robotic Process Automation (RPA) is a technology that has gained significant attention in recent years, particularly in the context of digital transformation initiatives across various industries. RPA is a software technology that enables organizations to automate repetitive, rule-based tasks that are currently performed by human workers. These tasks typically involve accessing, aggregating, updating, analysing, and processing data across different systems and applications. RPA software is designed to mimic human actions, allowing it to interact with various systems and applications in the same way as a human worker would.

In today's fast-paced business environment, organizations strive to improve the efficiency of their operations through the redesign and management of their business processes. The real challenge for organizations is to balance cost efficiency with other performance objectives such as scalability, flexibility, security, and compliance. The industry has tried different options to balance these objectives, and RPA is one of the solutions that have emerged as an effective tool for achieving this balance. RPA is a completely software-based solution that can help organizations to automate repetitive manual tasks, which are currently performed by millions of human workers. By automating these tasks, RPA frees up human workers to focus on higher-value tasks that require human judgment and decision-making.

One of the key features of RPA software is its ability to record human actions on a computer and perform the same steps when required. This is known as process recording. RPA bots can be programmed to record the mouse clicks, keyboard strokes, and other actions of a human worker while performing a particular task. The recorded process can then be automated by the RPA bot, eliminating the need for human workers to perform the same task repeatedly. This feature is particularly useful in industries where repetitive tasks are common, such as manufacturing, logistics, and finance. Another important capability of RPA software is web scraping, which involves extracting data from websites. This can be useful in industries such as finance and marketing, where data from multiple sources needs to be aggregated and analysed. RPA bots can be programmed to extract data from websites and feed it into a central system for analysis. This can help organizations to make data-driven decisions and improve their overall performance.

RPA bots can work with data processing. This involves manipulating and analysing large volumes of data. For instance, an RPA bot can be programmed to perform data entry tasks, data migration, and data validation. RPA bots can also be used for monitoring and reporting on system performance and errors, automating testing and quality assurance processes, and automating email processing and responding. RPA software is a versatile tool that can automate a wide range of tasks, from recording human actions and web scraping to working with applications, image processing, and data processing. By automating repetitive, rule-based tasks, RPA can help organizations reduce costs, increase efficiency, and free up human workers to focus on higher-value tasks that require human judgment and decision-making. RPA is a technology that has the potential to revolutionize the way organizations operate, and it is becoming an increasingly important tool for organizations that are looking to stay competitive in today's fast-paced business environment.

## II. LITERATURE SURVEY

Upon reviewing the existing literature on automation and Robotic Process Automation (RPA), numerous scholars have presented their research, comparisons, and findings on various automation technologies. This paper delves into the significance of incorporating Artificial Intelligence (AI) into RPA. As the need to automate complex tasks increases, robots must be able to adapt to changes in their environment. An intelligent robot should be able to predict the cause and effect of the action phenomena. Therefore, a smart robot must be AI-enabled, which differentiates it from another machine. The authors also discuss the implementation of AI-integrated automation in different fields such as banking, HR management, and so on. Although not all tasks can be fully automated, even partially automating tasks like HR management can save considerable time and energy. According to the paper, the next level of automation is Intelligent Process Automation (IPA), which is primarily developed from the integration of RPA and AI. Major products such as personal assistants (Alexa, Cortana, Google Assistant) and fraud detection systems utilized in the banking sector are examples of IPA.

The paper "Delineated Analysis of RPA tools" investigates various tools used for automating Robotic processes and compares them based on their functionality and output. There are currently multiple tools being employed in the market, such as UiPath, Automation Anywhere, Blue Prism, etc. This study analyzes the featured-based surveys to compare the services provided by these tools and select the most suitable one for RPA. The table provides details on the comparative study carried out in this research paper. As mentioned the comparison of the different tools is shown in the table below.[2]

Parameters	UiPath	Blue Prism	Automation Anywhere
Front Office/ Attended Automation	Yes	No	Yes
Back Office/ Unattended Automation	Yes	Yes	Yes
Script Based Designer	No	No	Yes
Visual Process Designer	Yes	Yes	Yes but. is script based
Openness of the Platform	Yes, has free 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

*Table Of Comparison of RPA Tools*

RPA can automate rules-based processes that involve routine tasks, structured data and deterministic outcomes, for example, transferring data from multiple input sources like email and spreadsheets to systems like ERP and CRM systems. Most applications of RPA have been done for automating tasks of service business process like validating the sale of insurance premiums, generating utility bills, paying health care insurance claims, keeping employee records up-to date, among others [9]

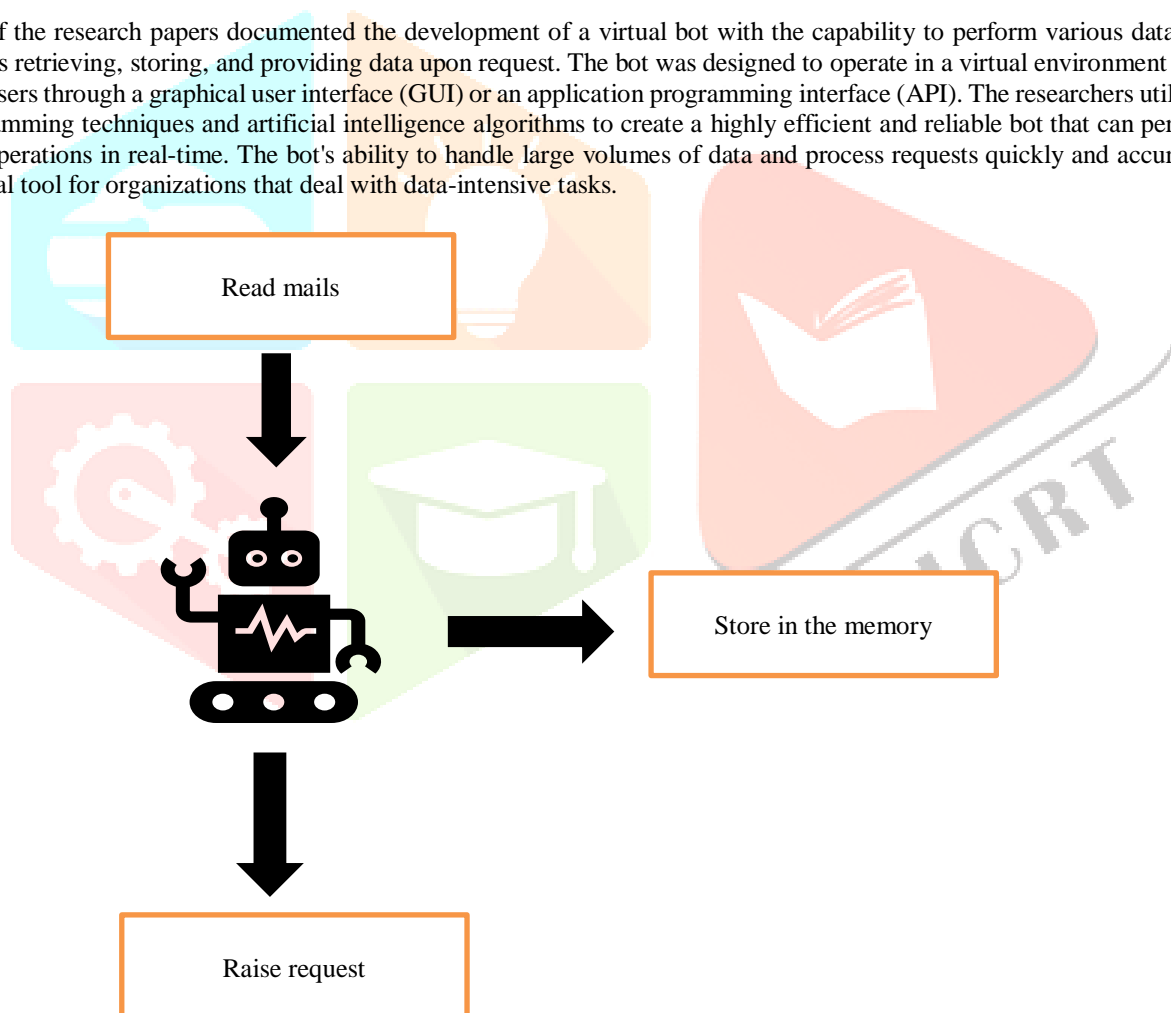
Xchanging is a business process and technology services provider that has implemented robotic process automation (RPA) to automate a part of its insurance sales validation process. The previous process was manually managed by human operators, who organized the data, checked for completeness and accuracy, and worked with brokers to correct errors. RPA has been implemented to manage the structured parts of the process, including finding errors, retrieving online data, creating official sales records, and notifying brokers when the process is complete. Xchanging has estimated cost savings averaging 30% per process due to the implementation of RPA.[10]

### III. METHODOLOGY

The aim of our search strategy was to identify and curate a comprehensive collection of articles pertaining to the subject of RPA. To accomplish this, we employed an evolutionary search methodology. Initially, we consulted an online RPA terminology catalogue to identify a set of potential keywords. We then conducted a preliminary Google Scholar search to refine these keywords and determine which domains and outlets RPA literature is most published in. Following this, we extracted and analyzed a few papers as an initial step. We then applied the search string to multiple databases, AB/INFORMS, IEEEExplore, Web of Science and Google Scholar. The search was conducted across keywords, titles, abstracts, and full-text fields and was not constrained to any specific time frame to ensure comprehensive coverage of published literature.

RPA software is also capable of launching and working with various applications, such as Word, PDF, and Excel. For instance, an RPA bot can be programmed to extract data from an Excel sheet and feed it into a database, or to generate a report in a specific format using a Word template. In addition to working with applications, RPA bots can also work with image processing. This involves analysing images and extracting data from them. For example, an RPA bot can be programmed to scan a document and extract data from it, such as the name of the document, the date it was created, and the text within the document.

One of the research papers documented the development of a virtual bot with the capability to perform various data-related tasks, such as retrieving, storing, and providing data upon request. The bot was designed to operate in a virtual environment and to interact with users through a graphical user interface (GUI) or an application programming interface (API). The researchers utilized advanced programming techniques and artificial intelligence algorithms to create a highly efficient and reliable bot that can perform complex data operations in real-time. The bot's ability to handle large volumes of data and process requests quickly and accurately makes it an ideal tool for organizations that deal with data-intensive tasks.



*Figure 1 Overview of Software Bot designed*

The task described is a workflow or process that can be automated using software. The process involves monitoring incoming emails for a specific type of email, which is a request for new assets. When such an email is received, the email needs to be retrieved and saved in a text file. Once the email is saved in a text file, the next step is to search for a specific field within the email using regular expressions. Regular expressions are a powerful tool for searching and manipulating text, and they can be used to extract specific information from the email. If the search is successful, meaning the field is found, then that field needs to be stored in a database for future reference. If the search is unsuccessful, meaning the field is not found, then the process needs to return to monitoring incoming emails. Once data is stored in the database, the next step is to raise a request with the appropriate department to fulfill the request for new assets. The process continues to monitor incoming emails for new requests for assets. If the process is stopped externally, meaning someone has manually stopped it, then it will stop running. However, if it is not stopped externally, then it will continue to monitor incoming emails and repeat the process for each new email received.

Overall, the process described involves several steps, including monitoring emails, retrieving emails, searching for fields using regular expressions, storing data in a database, and raising requests with the appropriate department. By automating this process using software, it can be performed quickly, accurately, and consistently, reducing the risk of errors and improving efficiency.

#### IV. RESULT

So, we can perceive how compelling RPA was with a specific end goal to take out Manual repetitive exertion and save time and money. Robots are good at extracting, processing and integrating information but they do not really understand the information. As a result, it cannot read or parse the text which is in an unstructured manner. Hence, there is a considerable measure of research work are occurring in cognitive document automation (CDA). CDA is a combination of artificial intelligence (AI) and software robots that automate the acquisition, understanding, and integration of documents and electronic data needed in business processes. In the future, we can do more research to integrate machine learning, natural language processing with robotic process automation and we can make a more robust robot.

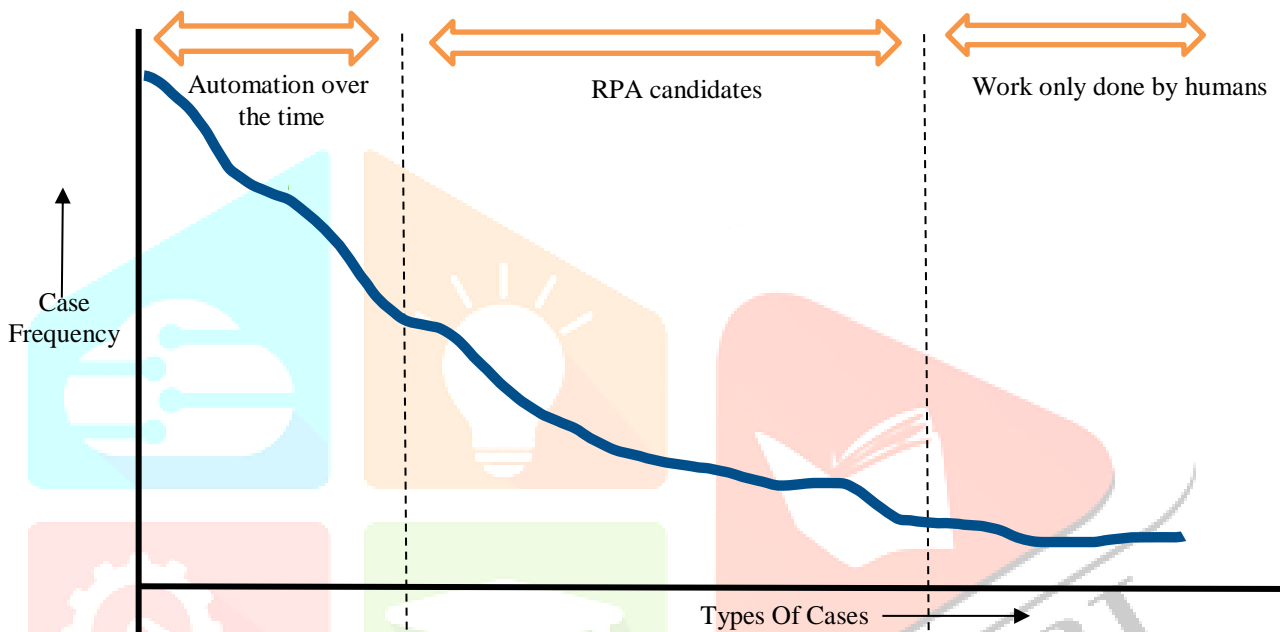


Figure 2 Positioning Of RPA

The figure illustrates a typical work scenario where the distribution of different case types follows a Pareto distribution. According to this distribution, 20% of case types make up 80% of the total workload, while the remaining 80% of case types make up the remaining 20% of the workload. Automating the most frequent case types using Robotic Process Automation (RPA) is a cost-effective solution. However, automating the remaining 80% of case types is often too complex and expensive, and human workers are still required to handle these cases. The remaining 20% of case types, which are less frequent but cover 80% of the case types, require human workers to enter information repeatedly and make decisions, serving as the 'glue' between different IT systems. Therefore, while RPA can support the middle part of the workload distribution, the 'end of the long tail' still needs to be handled manually by human workers,

#### V. FUTURE SCOPE OF RPA

Robotic Process Automation (RPA) can be easily applied to almost every domain in a business organization without affecting the existing system. Therefore, soon, RPA is expected to be widely used in different industries such as manufacturing, big data, analytics, and legal. RPA will automate all data input for agencies and manage computer processes governed by a set of protocols. Furthermore, RPA can also improve analytics for organizations offering web services. As more enterprises become aware of the benefits of RPA, its adoption is expected to increase steadily.

While RPA and AI are different, they are not necessarily separable. Soon, RPA is expected to become a part of AI, encompassing every aspect of it. Big enterprises will realize that combining RPA with their human workforce will result in greater efficiency and productivity. This integration of RPA with human workforce and tools will lead to a complete and evolved workforce. The next big change is expected to be the digital transformation of AI analytics, where human workers equipped with RPA tools will make up a digital workforce that encompasses every level of auditing for errors, thereby increasing efficiency and productivity for the respective domains. RPA innovation may address the following points in near future,

- Attended RPA has a lot of potential to improve customer experience by providing front-office employees with the digital assistance they need to complete their tasks more efficiently and effectively.

- Intelligent data capture and AI capabilities can help RPA handle unstructured and semi-structured data, making it even more valuable for organizations that deal with a large volume of unstructured data.
- Self-healing bots are another exciting development in RPA, as they can reduce the need for human oversight and maintenance by identifying and fixing errors in automated processes.
- Process mining is already a powerful capability, but it will become even more sophisticated and integrated with RPA in the future. Bots will be able to discover opportunities for automation that organizations may not have considered, leading to greater efficiency and agility.
- Extended BPM, where RPA is used to automate processes across systems, teams, and external partner ecosystems, is another exciting development that has the potential to transform how organizations operate.
- Finally, hyperautomation is a powerful concept that combines RPA with other technologies and tools, such as low-code platforms and process mining tools. By taking a business-driven approach and automating as many processes as possible, organizations can achieve greater efficiency, effectiveness, and agility.

## VI. CONCLUSION

In conclusion, while RPA presents a range of benefits to organizations, including cost reduction and improved efficiency, its implementation should be approached with caution and careful consideration for the potential impacts on employees and the wider community. As RPA has the potential to automate many routine tasks, organizations must ensure that employees whose roles may be impacted are treated with fairness and dignity, and given opportunities to upskill and transition to new roles. It's also important to recognize that while RPA can automate routine tasks more efficiently than humans, there are still many tasks that require human judgement and decision-making, which cannot be automated. Therefore, it's essential to strike a balance between automation and human expertise in order to achieve the best outcomes for both the organization and its employees. Additionally, organizations must invest in ongoing training and development to ensure that employees have the skills and knowledge required to work effectively alongside automation, and to adapt to changing technologies and remain competitive in the long term. By approaching RPA implementation thoughtfully and strategically, organizations can realize its benefits while mitigating potential risks and ensuring that employees are supported and empowered to succeed in the digital age.

Organizations should approach automation to achieve their business goals and solve their specific challenges, rather than simply adopting the latest technology trends. This requires a careful evaluation of their processes and objectives, as well as a deep understanding of their customers' needs and expectations. Intelligent automation, which combines artificial intelligence and machine learning with RPA, can provide organizations with the ability to analyse data, make predictions, and improve decision-making processes. By leveraging these tools, organizations can optimize their operations, enhance customer experiences, and achieve competitive advantages.

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