

Robotic Process Automation: Chatbot integration for task automation (Banking Industry)

Rahul Varfa¹, Ujjawal Khare², Abhishek Gupta³ and Gaurav Sharma⁴

¹⁻³B. Tech student, Medi-Caps University, Indore, India, Dept. of Computer Science

⁴Assistant Professor, Medi-Caps University, Indore, India, Dept. of Computer Science

Email: varfarahul65@gmail.com, ujjawalkhare369@gmail.com, abhiindurkhyaa7@gmail.com, er.Gaurav622@gmail.com

Abstract— This research paper examines the use of robotic process automation (RPA) in banking chatbots. As the banking industry continues to drive digital transformation, chatbots are becoming an increasingly popular tool for customer service and support. However, chatbots have limited functionality and can struggle with complex banking tasks. RPA offers a way to automate these tasks within chatbots, providing more accurate and efficient service. Make it available to your customers. This whitepaper examines the benefits and challenges of using his RPA in a banking chatbot and presents a successful implementation. The findings of this study may help banks looking to improve their chatbot capabilities and enhance the customer experience.

Index Terms— Chatbots, Robotic process automation, Artificial intelligence, RPA.

I. INTRODUCTION

As we are entering a new era of automation where humans and machines will increasingly work hand-in-hand. The integration of chatbots with RPA that is robotic process automation can lead to the optimization of business processes. Robotic process automation is generally more suitable for back-end processes, while traditional chatbots are used to support customer interaction in the front office [1]. However, the combination of these two technologies can lead to more efficient work and the standardization of repetitive tasks on a higher level [1][2]. The use of robotic process automation can also result in fewer errors in data analysis, while relieving employees from routine and repetitive tasks [2]. The design science research methodology can be used to develop IT artifacts that are purposeful in their appearance to the external user, and a design theory is important in this regard [1]. Nevertheless, it is important to note that customer requests that require an employee to execute an internal process cannot be fulfilled by chatbots alone [1]. Testing the developed artifact is also crucial to prove its concept and ensure its effectiveness [1]. The integration of chatbots with robotic process automation can also lead to more demanding duties for employees, as they are supported by robots and can handle more processes [2]. Therefore, the use of chatbot integration with robotic process automation can lead to more efficient and optimized business processes [2]. Chatbots interact with users, identify their intent, and help them complete the intended user journey. Robotic Process Automation (RPA) can integrate with chatbots and help them complete business processes, access, or store information with legacy systems that don't have APIs. We have integrated with RPA providers like UiPath, Automation Anywhere, etc. through APIs and other means.[3]

As context the banking business is quickly developing, and digital transformation is at the forefront of this transition. One of the most notable shifts in recent years has been the increased usage of chatbots for customer care and assistance. Chatbots are a handy and quick method for clients to connect with their banks, but they are

restricted in their capabilities and may struggle with more sophisticated banking activities.

II. LITERATURE REVIEW

Eliza was a pioneering chatbot. It was developed in the 1960s by MIT scientist Joseph Weizenbaum to serve as a psychiatric therapist in therapeutic recovery [4].

Following that, a variety of chat bots were developed with more user-friendly interfaces and sophisticated functionality as technology advanced. But every chatbot had a similar fundamental design: the user types the question and accepts the response in both text and speech. However, this process is very time-consuming, had several mistakes, and required a lot of behind-the-scenes work, especially in the banking sector. RPA enters the scene at this point since research has shown that it may be used to replace human operations in data mining procedures utilizing BOTs, enhancing processing [5].

This will decrease the expenses associated with automating tasks for businesses and the government, which will increase customer satisfaction [6].

Theorists discuss how the world is heading towards totally autonomous solutions and how it is anticipated that, starting with the fourth industrial revolution, man will be freed from boring and monotonous job and that automation will be the answer to many common chores. They described the advantages of RPA as the removal of the need for the workforce to complete a variety of services and the execution of a sizable number of tasks in the IT sector, workflow that can easily perform repetitive, algorithmized, and labor-intensive work efficiently [6].

Many studies have characteristics of an RPA literature review. In 2020, research by [7] shown how RPA may help businesses. Strategic, managerial, organizational, and operational benefits were divided into these four categories. In their organized evaluation of the literature, Syed et al. (2020) compiled a list of current RPA-related issues and subjects that require more study. [9] researched the definition of RPA used in academia as well as the amount of study done on its state, tendencies, and literary uses. [17] evaluated the state-of-the-art in RPA at the time and pointed out any gaps in the scholarly and professional literature by using an analytical mapping analysis. [8] A systematic review of the literature (SLR) was used to discuss RPA. 63 publications were found, categorised, and assessed for this SLR. Additionally, specific research goals were developed. The SLR results were also used to create a framework for carefully evaluating, comparing, and analysing RPA works that have already been finished and those that would be finished in the future. In a more recent literature review report, the application of AI-based RPA technologies to improve organisational and business processes that are a part of Industry 4.0 was investigated. In this area, [10] and [11] both conducted study. Both of them conducted detailed literature reviews for their master's theses on RPA in banking, but exclusively for RPA in the financial industry. As far as we are aware, only qualitative studies have looked at the advantages of RPA for enterprises. Above that, there is no method to classify the findings according to the various industries. We will give one or more case studies for each of the aforementioned industry categories as we mine for quantitative results. To demonstrate how RPA can be applied in certain sectors or processes, case studies are explained. If we provided some instances of how RPA might be applied to specific industries, we believe that people would be better able to comprehend how the technology might be employed in those sectors.

A. RPA uses in bank sector

Banks must digitize some internal processes to keep up with the fast-changing business environment. Hence, financial services are systematically using technology to lower costs and retain customers. Results information was sometimes scarce. Hence, the company may not announce all RPA results. We chose the table contents to determine if RPA installation benefits the enterprise or just a certain process. The table shows that these findings sometimes highlight organization improvement. Sometimes only process-specific enhancement results. Most cases of RPA implementation involve other technologies. Blockchains, big data, and cloud computing are examples. Banking uses legacy systems and AI. Conclusion: RPA in banking has many benefits. [12]

B. RPA uses in insurance companies

Insurance businesses all across the world monitor orders and provide feedback despite being overburdened with laborious back-office procedures. Insurance companies streamline processes to handle increasing demand and quicken processing. RPA technology is perfect for the insurance industry because to its complexity, which ranges from managing policies to submitting and processing claims across numerous platforms. RPA has many benefits over traditional automation, according to TheLabConsulting, including quicker claims processing, simpler policy cancellation, easier new business onboarding, improved data accuracy, standardised processes, compatibility with legacy systems and ease of implementation for new systems.[12]

C. How RPA works?

Several processes are run by RPA. The bots are instructed on what to do at each level by it. Once these processes have been programmed into RPA, the product can execute the programme and complete the predefined task at various times based on the requirements. Through integrations and screen scraping, they can also communicate with various frameworks, enabling RPA to perform tasks similar to those of a desk representative. [14]

One of the first industries to fully adopt automation was the banking industry. Currently, RPA is used by a number of large banks to automate processes like anti-money laundering, client inquiry processing, account opening, and KYC ("Know Your Customer"). These processes contain a large number of tedious rule-based activities, therefore it is simple to see the benefit of automating them fast [15].

Additional RPA uses in banking and financial services include reconciliation, report preparation, and different regulatory compliance activities. RPA allows businesses to automate finance operations such as account reconciliation and financial statements with minimum human participation.

- Choose to pay: RPA implements sophisticated invoice allocation and collection tasks for vendors by following a predetermined set of rules.
- From order to cash: Intelligent automation can assist you in thoroughly evaluating product orders, sales quotations, customer credits, invoices, and payments.
- Record to report: RPA makes it easy to automatically record journal entries, balance accounts, and handle daily transactions while maintaining a complete audit trail.
- Client onboarding: RPA bots gather all necessary customer information through the use of technologies like optical character recognition, resulting in a speedy and reliable client onboarding and KYC process.
- Intercompany reconciliation: RPA can relieve the accounting department of the burden of bank reconciliations by downloading data, creating a workflow for client accounts, confirming transactions, and reporting irregularities.

D. Wonder why RPA?

Businesses may construct intelligent automation systems that can perform difficult tasks and deliver superior customer service by integrating RPA with chatbots. An RPA-enabled chatbot, for example, may assist consumers with billing queries by retrieving customer data from various systems and automating the billing process. It can also automate processes like emailing consumers reminders, notifications, and alerts etc. [15].

RPA (Robotic Process Automation) has numerous advantages in financial chatbots. These are some of the primary benefits[16]:

- Banking chatbots may be created with RPA to automate repetitive and rule-based processes such as loan application processing, creating new accounts, and addressing consumer enquiries. This allows human agents to concentrate on more difficult activities that require human element[5].
- Since autonomous robotics will work around-the-clock, every day of the week, there won't be any vacations or holidays. RPA algorithms practically eliminate any human error and forbid any human involvement.[16]
- The typical payback period for an RPA project is between 9 and 12 months, which reduces the cost of operation delivery. It takes three to six months to manufacture and install an RPA robot.[16]
- More and more companies are now aware of the benefits that may be derived through the application of automation. The graph of businesses buying and using RPA will see a dramatic climb over the next few years. The business's customer-focused operations are expected to be controlled and managed by this technology.

The 5-lever digital strategy includes robotic automation. Infosys BPM, for instance, uses an RPA integrated digital finance services ecosystem.

With a 1,200-person team of RPA experts and consultants, they can expand RPA programmes for the finance and accounting function successfully and provide successful implementations to more than 60 F&A clients globally.

E. Banking RPA Case Studies

What real-life examples of banks utilizing RPA are there? In order to implement RPA, Productive Edge has collaborated with top banks and RPA providers including UiPath, Work fusion, and Automation Anywhere. Here are a few real-world RPA case study examples:[18]

1.Reduced Account Opening from 23 Days to 5 Minutes

An established bank with over 10 million clients sought to automate account opening to raise client happiness and cut costs. RPA bots, a single audit trail, a uniform automation platform, and Human-in-the-Loop functionality to route exceptions to bank staff were all included in the solution.[18]

2. Automating the Mortgage Application Process

By digitizing documents, utilizing machine learning, integrating automation with workflow and human-in-the-loop capabilities, and reducing backlogs and turnaround times, a bank was able to increase customer satisfaction.[18]

III. PROPOSED WORK

Introducing a system that will automate the critical procedures of banks that currently require the intervention of humans or the application of their intelligence, such as the completion of the Know Your Customer (KYC) form, the blocking of credit cards, and the checking of loan statuses, among other tasks. A chatbot application that uses a special key to operate and initialize itself to clients for the purpose of authenticating the services being provided to those customers.

The maintenance of open communication between financial institutions and their clients is the primary focus of the development of this project. We are going to construct these systems using resources such as UiPath, Kommunicate, API integration, NLP, and AI. These systems will have the bare minimum of requirements.

- *Uipath*

UiPath uses software robots, or "bots," to automate repetitive, manual processes. It uses a drag-and-drop interface to automate complex business operations. UiPath automates tasks including logging into apps, entering data, and copying and pasting. An email or form submission can start these operations. The bots repeat the stated tasks after being triggered, eliminating errors and increasing efficiency. Screen scraping, picture recognition, and artificial intelligence let UiPath automate procedures more accurately and efficiently. UiPath is a powerful RPA platform that automates repetitive, time-consuming procedures to optimize operations, decrease expenses, and improve customer service.

- *Kommunicate*

Multi-channel customer service chatbot Kommunicate. It uses chatbots, live chat, and AI-powered customer service. Kommunicate makes customizable chatbots for client inquiries and assistance. These chatbots can interface with Facebook Messenger, WhatsApp, and Slack for rapid, convenient service.

Kommunicate uses AI to automate customer service tasks like sending inquiries to the right department, answering FAQs, and measuring client mood and feedback. Kommunicate improves customer service by providing fast, effective, and personalized support across channels.

- *Twilio*

Twilio is an API library for developers that allows them to integrate text, audio, and video communication into their software projects via the cloud. The platform's building components simplify the integration of communication features into apps without the requirement for extensive network planning or carrier agreements. The Twilio APIs let programmers do things like make and receive phone calls, send and receive text messages, and even build chatbots. Tools for call recording, call tracking, and call routing are also available on the platform.

- *AI & NLP*

AI is the science of making machines that can learn, reason, and solve problems. Image, speech, and decision-making applications can use AI algorithms trained on massive datasets to spot patterns and make predictions. Yet NLP is a branch of AI that helps machines interpret and analyze human language. Chatbots, voice assistants, and sentiment analysis.

But this improved chatbot introduced with some manual task which are performed using human intervention:

The process from chatbot design to embedding is depicted in the diagram below.

- Beginning with chatbot development, we have Kommunicate, a chatbot creation platform with cutting-edge tools and features for defining a chatbot body with technologies like AI and NLP. API-enabled and included in a demonstration website.

- A variety of tools and services were used to create the chatbot's backend, the first of which being UiPath. We were able to create, set up, and maintain software robots using UiPath that perform tasks like data security, data extraction, and report creation, among others.
- UiPath's RPA software robots are designed to operate software and hardware in much the same way a human operator would.
- Twilio is a service software that lets us integrate messaging as communication services into these applications using APIs (Application Programming Interfaces), which we have used for SMS conversation like OTP sending and session summary details.
- Then, by combining them, a prototype is made.

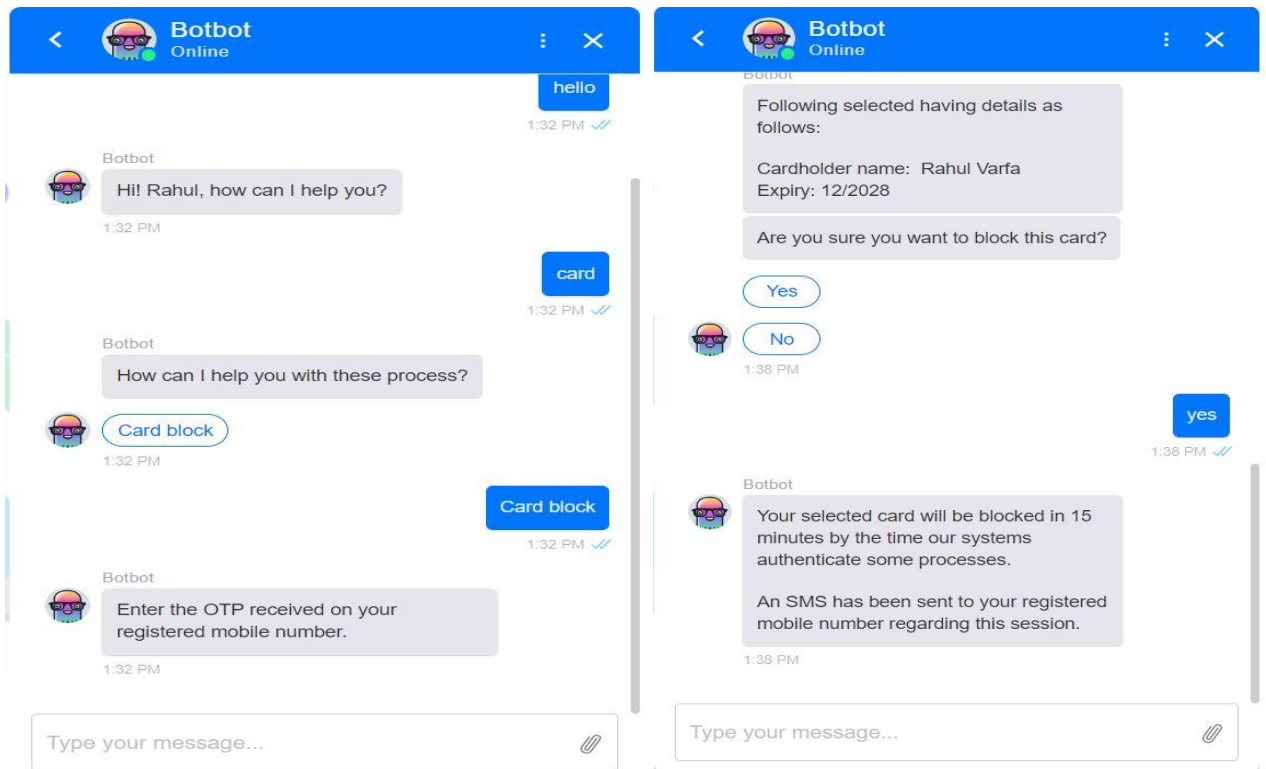


Figure 1. Images of the dashboard of our chatbot

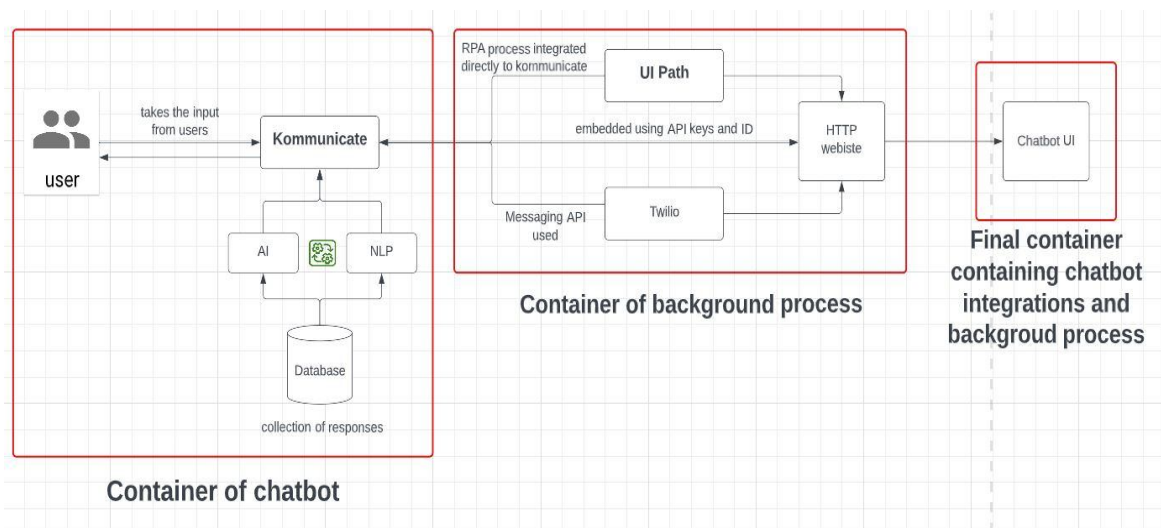


Figure 2. Chatbot with RPA prototype

IV. RESULTS

TABLE I. PROBLEM STATEMENT AND CHATBOT SOLUTIONS ACCURACY

S.NO	Problems	Chatbot Solution	Chatbot with RPA Solution(Potential Results)
1	Attempts of self-service	30% of customers indicate their attempts at self-service fail.	15% of customers indicate their attempts at self-service fail.
2	Reduction in Support Person	12% reduction in support personnel	90% reduction in support personnel
3	Improved access and faster processes	15% improved access and faster processes	85% improved access and faster processes
4	Improvement in agent productivity	50% improvement in agent productivity	90% improvement in agent productivity

RPA bots can offer back-office IT help by automating essential system administration operations, such as validation, testing, diagnostics, and problem eradication. RPA bots can offer front-end and back-office automation for accounting, inventory control, and high-volume such as password resets, are help desk chores. Employees could be given more time to focus on controlling exceptions, improving existing processes, and completing work using conversational interfaces offered by chatbots with the help of RPA bots and other automation tools.[19]

TABLE II. COMPARISON BETWEEN A TRADITIONAL CHATBOT & CHATBOT WITH RPA INTEGRATION

S. no		Interactive/ conversational chatbots	RPA integrated chatbot
1	Methods & Technology Used	Only chatbot development tools, including PatternMatching, Artificial Intelligence Markup Language (AIML)[21], Latent Semantic Analysis (LSA)[22], Chatscript, RiveScript [23], Natural Language Processing (NLP)[24], Natural Language Understanding (NLU)[24], etc., were used in its development, and the application framework was integrated.	In addition to chatbot development tools, RPA scripts, processes, SMS APIs, Uipath, Kommunicate, API integration, Twilio, and AI are also used.
2	Results	Only a small portion of the workflow is automated, but questions are answered	enhanced work flow automation and process management.
3	Human intervention	A system will contact a person directly or assign a human representative if it recognises that a customer is upset.	The finest automated solution with little or no human intervention can only be offered by humans participating in scripting who can also identify the underlying problem.
4	Automation handling	Maximum process handling is 50%. only follow the listed instructions.	Nearly 80% of the automation is managed By this chatbot, with 20% reserved for human baccess for specific queries.
5	Use case	back office operations, administrative procedures, frequently asked inquiries, and customer service.	Customer driven processes are the only ones that are user centric and automate key assistance.
6	Future scope	Voice and chatbot integration for customer support is available on over 70% of services, which will be helpful in the future for users who don't want to go through cumbersome steps to get their issues answered.	Since these new technologies have a potential market size of over 200% as they develop, many businesses will be aware of them. They will undoubtedly spend money to protect their technology and business activities.

Source from kore.ai[19]

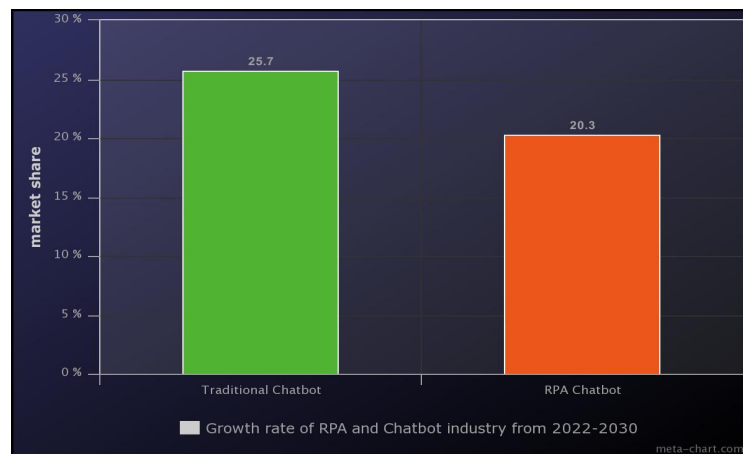


Figure 3. Growth rate of RPA and chatbot industry from 2022-2030

V. CONCLUSION

The automation of previously manual processes is a vital initial step in the digital transformation of the banking business. Because of this adjustment, not only will we save time, but also our service will be of the highest possible quality. Robotic process automation, also known as RPA, is a type of automation in which tasks that a person may complete are instead completed by a robot or by computer software. RPA, which manages a collection of processes and enhances quality, scalability, and resilience via the use of procedures that are efficient and cost-effective, can be of significant benefit to a bank. Training of staff members is essential for the successful adoption of RPA. When utilizing RPA, it is imperative that the safety of the customer's money be a top priority. RPA and chatbot integration can help modern businesses overcome some of their biggest problems. It allows chatbots to instruct RPA to carry out a certain task based on the user's query. This means that little to no human interaction would be required, resulting in lower operational expenses as well as increased organizational productivity and efficiency.

DISCUSSION

Traditional chatbot methods and technology included Pattern Matching, Artificial Intelligence Markup Language (AIML)[21], Latent Semantic Analysis (LSA)[22], Chatscript, RiveScript [23], Natural Language Processing (NLP)[24], Natural Language Understanding (NIU)[24], and others, which are effective but require a large number of workers, are inefficient, and are incapable of performing automated tasks. That is why we worked on Robotic Process Automation: Chatbot integration for task automation (Banking Industry), which employs typical chatbot development tools in conjunction with RPA scripts, processes, SMS APIs, UiPath, Kommunicate, API integration, Twilio, and AI. This makes the chatbot more efficient, faster, and with lesser errors. And, as can be observed in the graph above, the chatbot and RPA industries are predicted to develop at an average of over 20 percent each year, suggesting that our chatbot might outperform the competition.

FUTURE SCOPE

The technology that automates robotic processes has a bright future, and businesses are growing increasingly interested in it due to the flexible costs associated with its deployment. It is also capable of integrating with other technologies, a capability that has the potential to have specific effects in a variety of fields, including the medical industry, economic management, and many others. It's possible that in the future, chatbots that use rpa will make it possible for faster multichannel data processing and much improved conversion-based questions and responses.

- In addition, regarding this project, authenticated login credentials can be added through banks by providing the user with an authenticated access key.
- Include some notifications or notices addressing questions pertaining to bank accounts and financial transactions.
- Can be created as a software in order to distinguish itself from competitors, and future updates may include additional capabilities.
- In 2022–2023, global spending on RPA software is expected to reach \$2.9 billion.[20]

TABLE . FORECAST FOR GLOBAL RPA SOFTWARE END-USER SPENDING IN US DOLLARS

YEAR	2021	2022	2023
End-User Spending	2,389	2,854	3,352
Growth (%)	30.9	19.5	17.5

REFERENCES

- [1] <https://aisel.aisnet.org/acis2020/15/>
- [2] <https://sciendo.com/article/10.2478/emj-2020-0009>
- [3] <https://yellow.ai/chatbots/how-rpa-and-chatbots-integration-works/>
- [4] Weizenbaum, J. (1966). ELIZA—a computer program for the study of natural language communication between man and machine. Communications of the ACM.
- [5] Fettke, Peter & Loos, Peter. (2018). "Structuring Information Systems in the Era of Robotic Process Automation" In ResearchGate, 10.1314 0/RG.2.2. 18811.36648.
- [6] R. Uskenbayeva, Z. Kalpeyeva, R. Satybaldiyeva, A. Moldagulova and A. Kassymova, "Applying of RPA in Administrative Processes of Public Administration," 2019 IEEE 21st Conference on Business Informatics (CBI), Moscow, Russia, 2019, pp. 9-12.
- [7] Vitharanage I, Bandara W, Syed R, Toman D., An empirically supported conceptualisation of Robotic Process Automation (RPA) benefits. Twenty-Eighth Eur Conf Inf Syst 1–10, 2020.
- [8] Wewerka J, Reichert M., Robotic Process Automation -- A Systematic Literature Review and Assessment Framework, 2020.
- [9] Ivančić L, Vugec DS, Vukšić VB., Robotic Process Automation: Systematic Literature Review. In: International Conference on Business Process Management. pp 280–295, 2019.
- [10] Valgaeren H., Robotic Process Automation in Financial and Accounting Processes in the Banking Sector A qualitative study with experts in the field. 6, 2019.
- [11] Vanhanen J., Automation of Financial Management Processes By Utili- Zing Robotic Process Automation – a Finnish Banking Case. 124, 2020.
- [12] Robotic Process Automation: A literature review on quantitative benefits Mohammed Alfandi Ph.D. student in Industrial Engineering Graduate School of Natural & Applied Sciences Gaziantep University Gaziantep, Turkey ma21101@mail2.gantep.edu.tr Serap Ulusam Seçkiner Full Professor of Industrial Engineering Graduate School of Natural & Applied Sciences Gaziantep University Gaziantep, Turkey seckiner@gantep.edu.tr
- [13] Insurance Claim Processing using RPA along with Chatbot. Mr. Divyang Oza Undergraduate Student, Department of Computer Engineering K.J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai, University of Mumbai divyang.o@somaiya.edu Mr. Dhruv Padhiyar Undergraduate Student, Department of Computer Engineering K.J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai, University of Mumbai d.padhiyar@somaiya.edu Mr. Viraj Doshi Undergraduate Student, Department of Computer Engineering K.J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai, University of Mumbai viraj.doshi@somaiya.edu
- [14] ROBOTIC PROCESS AUTOMATION: CHALLENGES AND SOLUTIONS FOR THE BANKING SECTOR Pratik Patri Symbiosis Centre for Information Technology, Pune, Maharashtra, India.
- [15] <https://www.workfusion.com/blog/what-is-rpa-and-how-does-it-work/>
- [16] <https://www.ibm.com/cloud/blog/five-ways-to-use-rpa-in-finance>
- [17] Enriquez JG, Jimenez-Ramirez A, Dominguez-Mayo FJ, Garcia-Garcia JA., Robotic Process Automation: A Scientific and Industrial Systematic Mapping Study. IEEE Access 8:39113–39129.
- [18] <https://www.productiveedge.com/blog/robotic-process-automation-banking>
- [19] <https://www.smallake.kr/wp-content/uploads/2018/08/WP-RPA-Software-Robots-vs-Chatbots.pdf>
- [20] <https://www.gartner.com/en/newsroom/press-releases/2022-08-1-rpa-forecast-2022-2q22-press-release>
- [21] Marietto, M., et al.: Artificial intelligence markup language: a brief tutorial. Int. J. Comput. Sci. Eng. Surv. 4 (2013).
- [22] Akma,N., Hafiz, M., Zainal, A., Fairuz, M.,Adnan, Z.: Reviewof chatbots design technique Int. J. Comput. Appl. 181, 7–10 (2018). <https://doi.org/10.5120/ijca2018917606>
- [23] Artificial Intelligence Scripting Language - RiveScript.com. <https://www.rivescript.com/>
- [24] Jung, S.: Semantic vector learning for natural language understanding. Comput. Speech Lang.56, 130–145 (2019). <https://doi.org/10.1016/j.csl.2018.12.008>
- [25] <https://finance.yahoo.com/news/chatbot-market-hit-3-99-103000942.html>
- [26] <https://www.fortunebusinessinsights.com/robotic-process-automation-rpa-market-102042>