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Robotic Process Automation (RPA) in Healthcare

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Abstract

Robotic process automation (RPA), a forthcoming technology revolution, intends to reduce people's daily workloads by getting rid of tedious and repetitive tasks. The scientific community is now able to conduct a wide range of new types of study in this area, which opens up a whole new universe of possibilities. Compared to robotics, it is a very different kind of technology. RPA is a relatively new and quickly growing sub-field of robotics. The healthcare and pharmaceutical industries produce a large amount of data, or what we may refer to as "medical big data," making it all the more important to analyse and assess this data when it comes from different sources. The main features would include managing appointments, patient scheduling, managing claims and automating medical claims, Invoice Processing, Healthcare Inventory Management, personalized healthcare, Automation in the contact centre and Management of the Treatment Cycle. The extra feature proposed in this model is the mental health monitor system. In this study, we reviewed the most recent studies on mental state monitoring, concentrating primarily on those that use sensors to collect behavioural data and machine learning to analyse that data. we provided a classification taxonomy that, in our opinion, will aid new researchers in this subject in comprehending the general structure of such systems.

1. Introduction

Robotic Process Automation simplifies complex processes, which results in better outcomes for patients. For automating software-based business processes, robotic process automation is crucial. RPA is an approach to automation based on software that automates business processes by comprehending existing procedures. It is software that performs most of the repetitive tasks and activities that require human intervention. In today's environment, every organization is competing with other organizations. For this reason, RPA technology provides more profitability and efficiency in the work when certain rigid processes are automated. This system reduces the involvement of humans in the process. Human workers can focus on more difficult tasks, be more creative, and use their precious time to improve their skills and knowledge thanks to this type of automation. The three main phases of any processed task are planning, carrying out, and monitoring. In large organizations, RPA is viewed as a scalable, significant, and safe method for making automated projects easier to use. According to researchers, RPA will be an important technological development over the next ten years and will become increasingly valuable and powerful. RPA is proving to be the technology of

the future, and its objective is to provide a solution that improves operational processes' quality, speed, and efficiency while also reducing costs and time. RPA in healthcare helps to automate processes and improve healthcare operations (Micera et al.). As a result, healthcare organizations can save billions of dollars in the coming years by using RPA in healthcare to provide adequate medical care to more people at once. In addition, there is more to this quantitative problem; The qualitative aspects of RPA in healthcare should not be overlooked. RPA is an unmanageable technology that is finding applications in domains where repetitive tasks are performed. Companies that implement RPA projects benefit from cost management and work efficiency. Reducing errors contributes to process accuracy improvement. It operates round-the-clock, year-round, and eliminates risks.

1.1. Literature survey

Paper (Kazanzides et al.) Ram D. Sriram (Aug 22, 2009) in According to "The Role of Standards in Healthcare Automation" this paper's two main components are medical devices and healthcare informatics. Medical devices deal with hardware-based tasks, while healthcare informatics covers all system- or software-related procedures. The authors of this study discuss the standard functions of healthcare, including bio images, simulation, medical device integration, and electronic health records.

Paper (Fichtinger et al.) A. Azaria, A. Ekblaw, T. Vieira and A.Lippman in their article "Using blockchain for medical data access and permission management" (Aug. 2016), the authors described how to use block chains to handle authorization in the medical domain using the built application Medrec. The computerised execution of services, disparity access control for different user types, the adoption of healthcare regulations, logistics, remote data collection indexing, the unification or calibration of information, redundancy, and fault lenience are all advantages that result from the integration of block chain techniques with health care, according to several authors.

Paper (Hager et al.) T. Davenport and R. Kalakota (2019) in Artificial intelligence's promise in healthcare, it is a new technology that has applications in both business and healthcare and has the potential to modernise pharmaceutics as well as the administration, payment, and patient care processes. In the healthcare industry, where machine learning (ML) produced the greatest number of precision pharmaceuticals, artificial intelligence (AI) has been discovered to play a significant role.

Paper (Hogan and I Krebs) M. S. Oswal and P. Joshi(2020) in,Robotic process automation is a recent trend in automation. In this type of automation, human intervention is necessary to complete the tasks, and human agents support and trigger the bots to carry out the essential actions. This type of automation operates without human involvement, therefore there is no need to start the process, keep track of the system's performance, or even halt the job after the process is through.

Paper (Guglielmelli, Johnson, and Shibata) K. C. Moffitt, A. M. Rozario and M. A.Vasarhelyi(2018)Robotic process automation for audits, The automation process has been put in place to take attendance, handle the enrolment process, schedule meetings and online lessons with students and clients. The breadth of RPA in the audit sector has resulted in time savings through enhancing loan applications, supplier satisfaction, and customer growth.

2. RPA in healthcare

- With the reservation of an appointment control, RPA has made it easier for users to schedule appointments.
- Enhance customer experience throughout the billing process, from appointments to treatments.
- RPA has the potential to eliminate friction, time, and value while also ensuring that carriers have the records and the time necessary to make primary care decisions.
- The mechanical approach to medical billing and coverage claims is more accurate and reliable.
- Virtual robots are used in RPA to automate the assessment, backbone, and resolution of healthcare claims issues.
- RPA software robots combine records and automatically send emails and follow-up messages.
- With virtual bots automating patient remote tracking and care coordination, hospital control gains high-quality green.
- RPA makes it easier for doctors to control their patients and frees up healthcare providers to focus

on their work as doctors spend more time with patients.

• RPA bots automate a patient's records to alert them to their unavailability and verify discharge instructions.

• RPA makes feasible records access and migration systems attainable with a high degree of accuracy and supports usage control. It aids in numerous situations, including club control and 24-hour customer support.

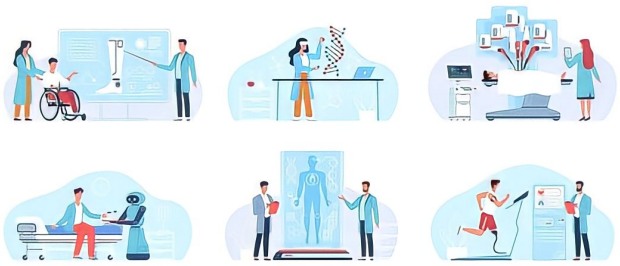

FIGURE 1. Automation in healthcare

2.1. Benefits of automation in healthcare

1. RPA can automate data digitization and accounts payable operations, increasing the efficiency of billing.

2. Healthcare organizations can save a lot of money and labour by modernizing their administrative procedures. Healthcare practitioners save time by delegating labour-intensive activities to robots.

3. RPA can automate data digitization and accounts payable operations, increasing the efficiency of billing. Healthcare organizations can save a lot of money and labour by modernizing their administrative procedures.

4. Healthcare practitioners save time by delegating labour-intensive activities to robots. They can expand their clinical training by using these extra time resources to generate higher-value work by concentrating on more precise patient attendance rather than laborious data entry.

5. Software robots can significantly improve the effectiveness of patient scheduling. Because of their proficiency, they can take into account a wide range of information in the appointment requests made by patients such as their medical histories, present diagnosis, location, insurance providers, personal preferences etc., and use the information to create appointments that closely match what is most important for the patients.

6. RPA in healthcare becomes more than just an alternative because it holds out the possibility of providing suitable care for an increasing number of patients (F et al.) .

7. Payroll and time attendance processing, for example, might be automated to free up time for personnel in an HR department. Healthcare workers will be able to concentrate on improving patient outcomes by implementing robotic process automation.

8. The ability of the digital workforce to input, organize and analyse massive volumes of medical data quickly and accurately will significantly aid in extending care.

9. Making the most of RPA deployment in the healthcare sector is a promising strategy for overcoming existing obstacles unique to that sector. Solutions that support robotic process automation automate the procedures of arranging appointments resolving insurance claims, and billing.

10. RPA technology in the medical field helps doctors access and track patient health information. RPA solutions in the healthcare industry guarantee enhanced automation and effective workflow. Enables systems of the future to automate monotonous operations and improve client services.

2.2. Use cases

2.2.1. Managing appointments and patient scheduling:

Scheduling and managing patient visits are one of the most time-consuming tasks for healthcare professionals (Wang and Wong). Intelligent automation enables patients to use self-service booking tools and individualised multi-channel communications to confirm, modify, and update patient record systems, freeing up staff members to focus on front-line care.

2.2.2. Managing claims and automating medical claims:

Healthcare providers can process thousands of claims in hours as opposed to weeks thanks to intelligent automation, which also helps them handle claims more quickly, help patients and providers more effectively, and lower the number of unpaid claims (Mataric et al.). Data entering mistakes can be eliminated and a platform that can readily be updated in step with shifting government regulations is provided by using digital employees to automatically manage conversations between various parties in claims administration.

2.2.3. Invoice Processing:

Numerous invoice types, which are historically maintained manually from the time of delivery through payment, can be found on products that are delivered to hospitals and other clinical organisations. The information from invoices may now be read, converted, and uploaded by businesses using intelligent automation in conjunction with optical character recognition, which allows for the automatic distribution of the data throughout the organisation.

2.2.4. Healthcare Inventory Management:

In addition to becoming more challenging, manually managing healthcare inventory also consumes precious time and resources (Kidd, W Taggart, and Turkle). Healthcare providers can develop a trustworthy system that allows them to view purchase/usage trends, place orders automatically, and have a real-time view of inventory using intelligent automation.

2.2.5. Personalized Healthcare:

Personalized healthcare attempts to offer individualised treatments based on the quick analysis of various data sets, rather than treating everyone with the same medications, procedures, and advice. Digital workers can collect and consolidate data sources, and then use data analytics to determine the best treatment for an individual**.**

2.2.6. Automation in the contact centre:

Any healthcare provider's success depends on having a successful contact centre. By automating straightforward questions and creating a single source of truth for patient data, intelligent automation enables a provider to empower its contact centre staff to better serve patients. While patients spend less time on the phone, doing so frees agents from time-consuming activities and allows them to concentrate on patient requirements.

2.2.7. Management of the Treatment Cycle:

Obtain information from the database on the patient's specifics, the diagnosis, and the previous treatments. To understand which treatment approach is useful for patients, which condition is frequently identified, which medications have been successful for patients, and what types of cases are frequently received, data must be extracted and analysed.

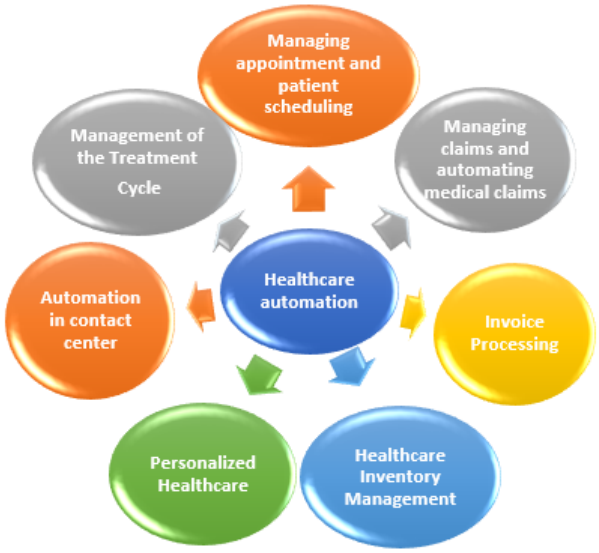

FIGURE 2. Design Diagram

2.3. Security

The two main risks related to RPA are data leakage and theft. If proper security protocols are not in place, sensitive data, like RPA bot credentials or consumer data processed by RPA, may be revealed to attackers.

RPA passwords are frequently traded for them to be reused. When these usernames and passwords are left untouched and insecure, a cyber attacker may intercept them, utilize them to escalate privileges, and transfer them laterally to get access to personal networks, software, and data (U Bers et al.) . On the other side, users with administrator privileges will find passwords in exposed places.

2.4. Ways to prevent security risks with robotic process automation (RPA)

The following actions are to minimize the security risks associated with robotic process automation.

2.4.1. Restricting access:

This limits each team member's access and activities to their designated roles and prevents any errors or fraudulent conduct. You may, for instance, build a protocol that prevents changes from being made in the live environment without the consent of a particular individual (Prochazka). All users, processes, and individuals must then enter their login credentials to access the system, creating a paper trail. Only a select group of authorized users can access sensitive data within the system.

2.4.2. Centralized management team credentials:

Monitoring the actions taken by robotic processes offers an internal control centre for login credentials, enabling better and more direct transparency over potentially problematic acts.

2.4.3. Ensuring that the RPA platform produces accurate and reliable logs:

The first step a management team should do when investigating a problem with an RPA system is to review the logs. RPA logging should be directed to a different device where data is securely processed and rigorously safeguarded to conduct adequate investigations. Therefore, security administrators must make sure that the RPA tool creates an accurate, system-generated log without any gaps that could impede an investigation.

2.4.4. Applying effective change management:

A structured change management procedure is essential to ensure accountability and auditing of RPA adoption. This should specify who is in charge of carrying out modifications, evaluating risk, examining performance, approving them, running backups of earlier versions, and notifying the user community.

2.4.5. Data encryption:

The encryption process is an additional, crucial layer of protection for your data from harmful external attacks. It indicates that cyber invaders are less likely to be able to access information or intellectual property if it were to be stolen.

3. Proposed system

RPA has several uses in a variety of fields, such as healthcare and medicine, and it produces some extremely encouraging outcomes, but just like any other new technology, it faces several difficulties. It has the potential to eliminate repetitive work in a range of roles, functions, and departments. It also has a technical implementation that is comparatively unobtrusive and has a short learning curve for people who use it. As different organisations implement RPA, a configuration that works for one may not work for another. Patients, doctors, insurance providers, etc., are the primary players in the healthcare industry. A more effective and accurate back-office process is urgently needed to maintain a balance between the growing number of patients and the paperwork required for follow-up, insurance claims, etc. In this regard, robotic process automation (RPA), a modern advanced automation solution, can assist healthcare businesses to boost operational efficiency, reduce expenses, and reduce the likelihood of human error while processing information including physician credentialing, enrolment and patient qualification, patient rescheduling, coding, claims administration, clinical information, Medicaid billing and complying, secondary claims management, accounts receivable. This is true for both larger, enterprise-wide deployments that include every function and smaller, more focused deployments. Since not many people are still persuaded to use robots in surgery, there are still certain trust difficulties present. There are also governance and policy issues because RPA in healthcare and medicine is currently not properly governed. RPA advancement and adoption can undoubtedly provide a large number of IT jobs for workers to manage and maintain software programmes, but on the other hand, it is impossible to overlook the reality that many people will become unemployed as a result. Additionally, healthcare organisations encounter difficulties when introducing new medications to the market since they must uphold their standards for quality, effectiveness, and profitability. Process automation technologies can be used to alleviate the regulatory and reporting issues that the healthcare industry's innovation processes frequently confront. By using these methods, healthcare providers may increase patient safety and market more potent medications. In this proposed system we have involved security measures involving maintaining patients' data with utmost priority not just patients' data but also the abstraction of management data. Additionally, any healthcare that divulges patient information runs the danger of damaging its reputation, which would hurt sales. Individual patients can, however, be transmitted across the system from one end to the other thanks to automation and the decrease of a manual process, which lowers exposure to unauthorised people. With this model, we propose an increase in productivity and stabilise the output flow. The extra feature proposed in this model is the mental health monitor system. In this study, we reviewed the most recent studies on mental state monitoring, concentrating primarily on those that use sensors to collect behavioural data and machine learning to analyse that data. we provided a classification taxon-

omy that, in our opinion, will aid new researchers in this subject in comprehending the general structure of such systems. We found essential characteristics in the evaluated literature. The major stages of mental state monitoring systems, from experiment design through implementation, were also highlighted. These comprise crucial elements and factors to take into account for the data gathering process, data processing, and the development and testing of machine learning models. Let us look at a sample architecture of how the system will work.

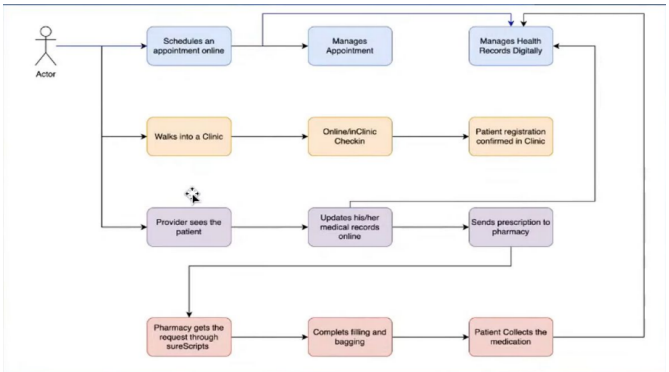

FIGURE 3. Architecture of the system

4. Results

Robotic process automation will be able to develop on its own. The next significant development in this technology will be the increased usage of AI, digital employees, the entire workforce, and digital transformation. Access to digital technologies and employee empowerment through them will foster innovation, creativity, and teamwork. By merging various expenses such as tests, drugs, food, and doctor fees into a single, simpler payment, RPA can be utilized to speed up the settlement of health payment claims. With this quick and accurate bill processing, healthcare professionals may save time and prevent billing mistakes. Software bots that are driven by RPA can handle data input and migration tasks to gather and communicate the required information. It may free up healthcare workers to concentrate on other essential tasks. RPA encourages your healthcare institution to manage and store data digitally rather than on paper. Although there are now no suitable guidelines for fully implementing RPA in healthcare and medicine, there are also rules and regulations and policy issues. It is obvious that RPA acceptance and development can create more IT jobs for young people to administer and monitor software programs, but on the other side, it is also undeniable that this automated method will result in widespread unemployment. Some workers may lose their jobs as robots take their place.

5. Conclusion

In our opinion, AI will have a significant impact on future healthcare options. It is the main capability underlying the development of precision medicine, which is universally acknowledged to be a critically needed improvement in healthcare. It takes the form of machine learning. Although early attempts at making recommendations for diagnosis and therapy have been difficult, we anticipate that AI will eventually become proficient in that field as well. It appears likely that the majority of radiology and pathology images will eventually be reviewed by a computer given the rapid advancements in AI for imaging analysis. It will become more common to use speech and text recognition for purposes like patient communication and clinical note transcription. Not determining whether the technologies will be capable enough to be beneficial, but rather guaranteeing their acceptance in routine clinical practice, is the biggest hurdle for AI in various healthcare sectors. For AI systems to be widely adopted, they need to be endorsed by regulatory bodies, integrated with EHR systems, sufficiently standardised so that similar products function similarly, taught to clinicians, paid for by public or private payer organisations, and improved over time in the field. These difficulties will eventually be resolved, but it will take considerably longer than it will for the technology to advance. Additionally, it appears more and more obvious that AI systems won't significantly replace human clinicians in patient care; rather, they'll support them. Human doctors may eventually gravitate toward jobs and work structures that make use of innately human abilities like empathy, persuasion, and big-picture integration. Only healthcare professionals who refuse to collaborate with artificial intelligence may eventually lose their careers, according to some estimates. The best thing about this robotic process automation technology is how convenient and useful it is all the time for individuals who have special needs as well as elderly persons who are alone. Many companies throughout the world, including those in manufacturing, chemistry, healthcare, aviation, and other fields already covered

in this article, are attempting to implement these robotic process automation technologies. Let industry embrace humanoids with artificial intelligence to support human life. With the help of this technology, individuals will be able to care for the elderly, access services around the clock, escape perilous employment and dangerous situations, eliminate inefficiencies in workflow, increase productivity, and release workers from monotonous chores.

6. Authors' Note

We hereby declare that there is no conflict of interest regarding the publication of this article. We confirm that the paper is free of plagiarism.

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