A Synopsis on

# Robotic Process Automation of Supply Chain Management for Healthcare

Submitted in partial fulfillment of the requirements
of the degree of

## Bachelor of Engineering

in

## Information Technology

by

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# CERTIFICATE

This is to certify that the project Synopsis entitled *"Robotic Process Automation of Supply Chain Management for Healthcare"* Submitted by *"Hitarth Saiya (19204007),Jash Seth (19204006),Samyak Doshi (19204001)"* for the partial fulfillment of the requirement for award of a degree *Bachelor of Engineering* in *Information Technology.*to the University of Mumbai,is a bonafide work carried out during academic year 2021-2022

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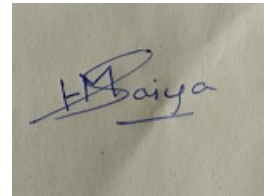Principal

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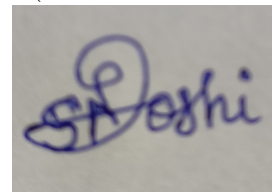Place:A.P.Shah Institute of Technology, Thane
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# Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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# Abstract

Nowadays, the need for systematic deliverance of the healthcare sector is much sought-after. Such, that a simple delay in restocking of certain medicines or supplies could create unrest among the mass, and result in the loss of healthcare facilities for many. Robotic Process Automation (RPA) is a software technology that can create, deploy, and manage bots that emulate certain human actions interacting with digital systems and software. Robotic Process Automation is one of the technologies that can be used to carry out the smooth sailing of the supply chain process. This paper will describe how RPA technology can be used to emulate the various processes in the supply chain management for a healthcare entity, such as checking inventory, reading and comparing vendor quotations, and finalizing a supply vendor.

# Introduction

The supply chain of a pharmaceutical entity is the means through which medicines and medical supplies are manufactured and made available to the patients. The traditional Supply Chain of the Healthcare industry involves raw material suppliers who supply raw material to the manufacturers for drug generation, packaging, and supplying to the distributors. The manufacturer maintains an inventory of drugs for smooth operations. The hospital's pharmacy or a retail pharmacy places an order to a distributor for stocking and restocking their inventory, based on the daily requirement.

In a healthcare environment, inventory refers to the medications and all the medical supplies used in its daily operation. A healthcare entity is required to ensure an adequate stock of medicines and medical supplies are available at all times to better serve the needs of their patients. An effective inventory management process should also contribute to the profitability of the entity. There are two goals of an efficient inventory management process. The first is to ensure medications are available whenever the patients need them. Optimal efforts should be made to always keep the medications used in stock and restock them before they go out-of-stock or get outdated and damaged. The second goal is to contribute to the overall profitability of the entity. The focus should be on being of service to the patients while also keeping the purchase costs of the medications at a minimum.

Robotic Process Automation is a business process automation technology that allows an individual or an organization to define a set of instructions for a software robots or 'bots' to perform. These bots mimic the way humans interact with software to perform high-volume, repeatable tasks. With the help of RPA, we can automate repetitive tasks such as checking inventory and reordering supplies and decisive processes such as reading and comparing vendor quotations and finalizing a supply vendor. This automation incorporated within the system will make it less prone to errors as well as less time-consuming.

Blue Prism is an RPA Tool that provides a virtual workforce to the organizations. It helps organizations to automate manual, repetitive, and rule-based business processes in an agile and cost-effective manner. It includes drag and drop support to automate the tasks. Some features of Blue Prism include: 1) It is platform-independent so that it can be used on any platform. 2) It contains robust features like load balancing, data encryption, and end-to-end auditing. Thus, every change is audited. 3) Blue Prism also supports automation of codes written in Mainframe, Java, Windows applications, and even web-based applications. 4) It supports all major cloud platforms, like Microsoft Azure and Amazon AWS. So, users can manage most of the tasks centrally.

Some advantages of the RPA include:

1. **Cost Savings:-** RPA helps organizations to save a huge amount of cost as it is typically cheaper than hiring an employee to perform the same set of tasks.

2. **Less Error:-** It works on standard logic and does not get bored, distracted, or tired. Hence, the probability of making errors reduces to a great extent, which means less re-work and an enhanced reputation for efficiency.

3. **Faster Processing:-** It works faster than human employees as computer software does not need breaks, food, rest, etc., and can perform repetitive operations tirelessly.

# Objectives

1. To automate inventory management System.

2. To maintain the adequate stocks of medications.

3. To minimize the occurrence of unexpected out-of-stock scenarios resulting from depletion or expiration of inventory.

4. To automate vendor selection Process.

5. To automate vendor On Boarding Process.

6. To contribute to the overall profitability of healthcare organizations by focusing on purchasing products at the lowest cost.

# Literature Review

In this paper [5], the author study aims at the current state of Robotic Process Automation and also recognizes the scientific and industrial literature existing gaps. Here author introduces 54 primary studies analysis which defines the RPA's current state of art. And specifies how these primary studies were selected based on systematic review. Also, the author reviews 14 commercial RPA tools based on 48 functionalities defined. The conclusion of the study is that certain phases except the Analysis phase are covered in majority of the tools and how the shortage of automation in such a phase reflects the technological solutions. Based on this, the author has described some challenges and future directions.

The [6] case study describes how software bots can change our daily life and how the Supply Chain Management process can be impacted once the concept of Robotics comes into the picture. This study describes the different home use cases and day-to-day chores where robotic automation can be used. The author also discusses how RPA has the ability to change the supply chain procedure and eliminate the way of retailing, transporting, and warehousing goods. Process standardization, IT support, the flexibility of the solution, stakeholder expectations, and employee engagement are some of the challenges that might come in the future while implementing RPA in the field of the supply chain.

In this literature [7], the author has given a detailed overview of Robotic Process Automation (RPA). As a result of its increasing popularity, several sectors such as HR, Manufacturing Retail, Telecom, Healthcare, Insurance, Travel and logistic, Banking financial services, Government Infrastructure have started using RPA. RPA tools offer four phases of deployment: i) Assisted Automation, ii) Unassisted Automation, iii) Cognitive RPA, and iv) Autonomous RPA. The author has given a detailed comparison of the three major RPA tools - Automation Anywhere, Blue Prism, and UiPath, out of which UiPath is the most popular tool. Decreasing turn-around-time up to 80less time consumption of routine tasks, and proper maintenance of system logs for ISO and auditing purposes are a few of the benefits RPA offers.

In the [8] case study, we reviewed the process model regarding how software testing automation allows us to accomplish the testing process in a faster way than compared to the traditional software testing process. This study differentiates Selenium web Driver and Work Fusion, which are the two methodologies of the software test automation with the new RPA based method. This study recommends combining the test scripts written in different programming languages with the RPA solution for performance improvement, less usage of resources, and making the tests more efficient, reliable, and accurate.

RPA has proven itself to be capable of performing and completing high volume processes which consist of redundant as well as tedious steps. In the research [9], RPA is used to automate the repetitive task of filling out and reading Google forms and input the information filled out in the form, onto a spreadsheet, for educational workshops. Since the software bots follow the exact steps and instructions given to them initially, RPA can effectively perform redundant tasks repetitively without leaving any room for human error.

# Problem Definition

Pharmaceutical Company's Inventory is controlled and managed using a warehouse management system. However, the activities performed on the system are mostly repetitive,rule-based, mundane, time and labor intensive. At times due to lack of management, products of pharmaceutical inventories are not ordered on time, which causes delay and it may also lead to a panicking situation amongst the citizens during hard times. Thus, there is need of Inventory management using RPA. So if the stock of product is reduced then it can be re-ordered automatically. To be precise, in this pandemic situation the need of medicines has increased. So, if the stock of it reduces and reaches to the threshold value then it can be re-ordered immediately and no delay will occur.

# Proposed System Architecture/Working

We propose a novel system where software bots will be programmed to carry out processes such as vendor selection, vendor on boarding, inventory management,and order processing which were previously carried out manually. In other words, the repetitive and time-consuming processes of the Supply Chain Management will be automated with the help of Robotic Process Automation (RPA). The incorporation of this automation within the system will make it less prone to errors as well as less time-consuming. Thus, this new proposed system will lead to increased productivity and throughput. With the help of RPA platform, we create a centralized location to connect all systems which can help the team members to access the required information. So team members can easily get real-time data and overcomes the disadvantage of the existing system of searching for a particular data from the record book. The vendor selection and onboarding processes will take place when the tenure current supplier terminates. The vendor selection procedure compares the quotations given by several candidate vendors and selects the deal with the best terms. The onboarding process will finalize the vendor selected, and make changes in the system and database accordingly.
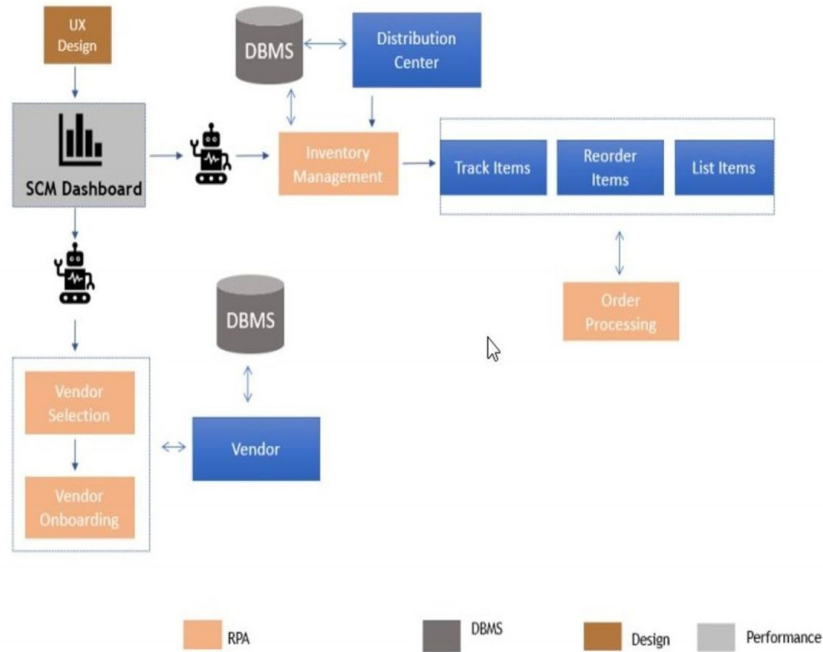


Figure 1: Proposed System Workflow

The inventory management and order processing procedures of the system are executed on a daily basis. The inventory management automation keeps a track of the pharmacy's inventory. When the available quantity of any medical product goes below its threshold value, the system will send an email to the supplier regarding the restocking of supplies. Upon receiving an 'Order Confirmed' or 'Order Delivered' email from the supplier, the order processing automation will make the necessary changes in the inventory database.

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# Design and Implementation

This system is implemented using Blue Prism Automation tool. Step by step procedure of how we have implemented this system is described below.

1. Firstly, Database is connected to the Blue Prism Automation Tool.

2. The process will check the available quantity of the products in the inventory.

3. If the available quantity of the products in the inventory is less than the certain threshold value then a product re-stocking process will be triggered which will send a mail to the distributor regarding products to be ordered.

4. A flag is assigned to each product in the inventory so as to avoid ordering same product multiple times. By default the flag value is set to false but when order for a product is placed, the process sets the flag value to true.

5. This process lists and stores the emails from the inbox in the collection.

6. The process checks the subject of the all the emails received since the last execution of the process. It weeds out the emails with subject that contains "Ordered Delivered or Delivered successfully" as a sub-text.

7. Here, it checks the name of the product for which the mail has been received. It updates the available quantity of that product and the flag is then set to false.
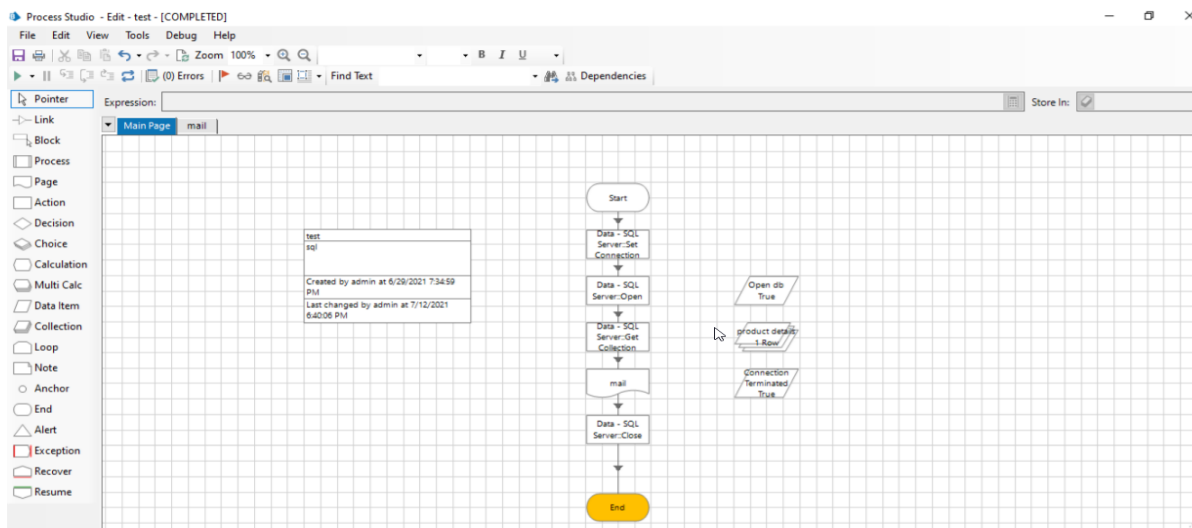


Figure 2: Process for connecting database to Blue Prism Tool

Figure 3: Process for email automation



Figure 4: Process for recognizing received email
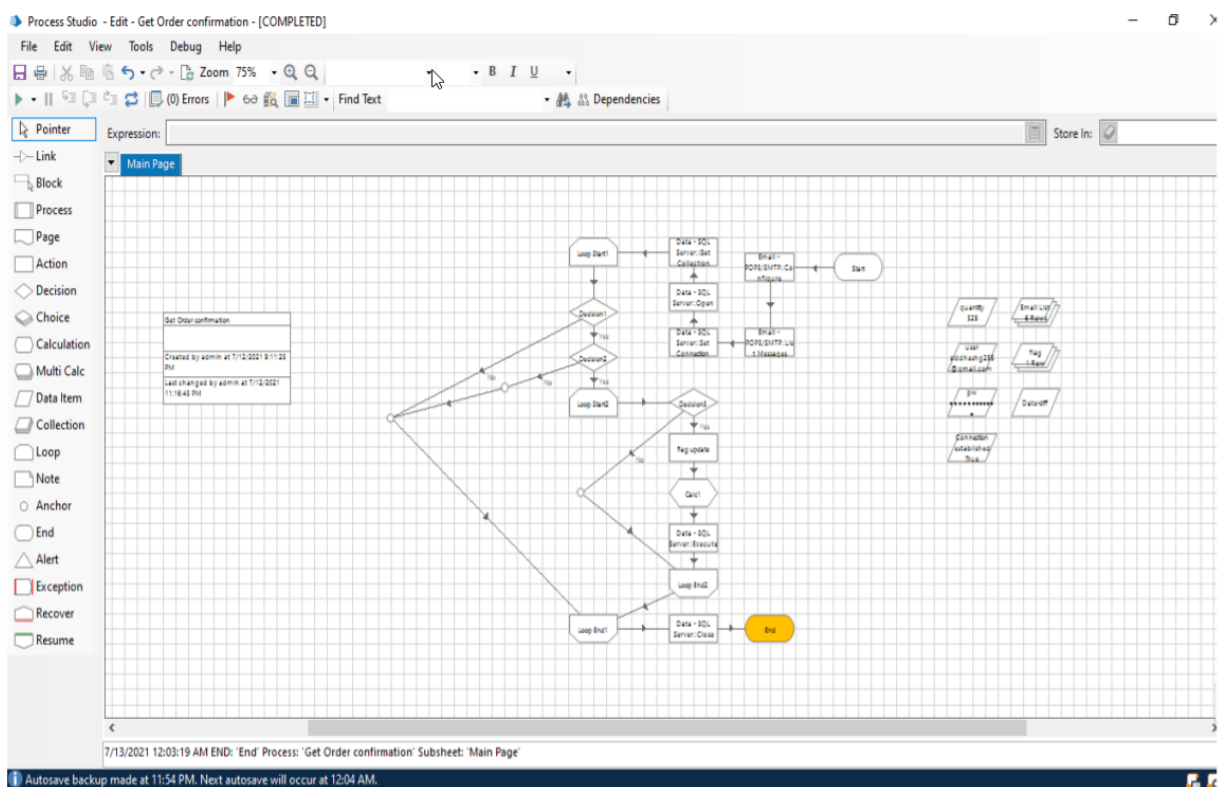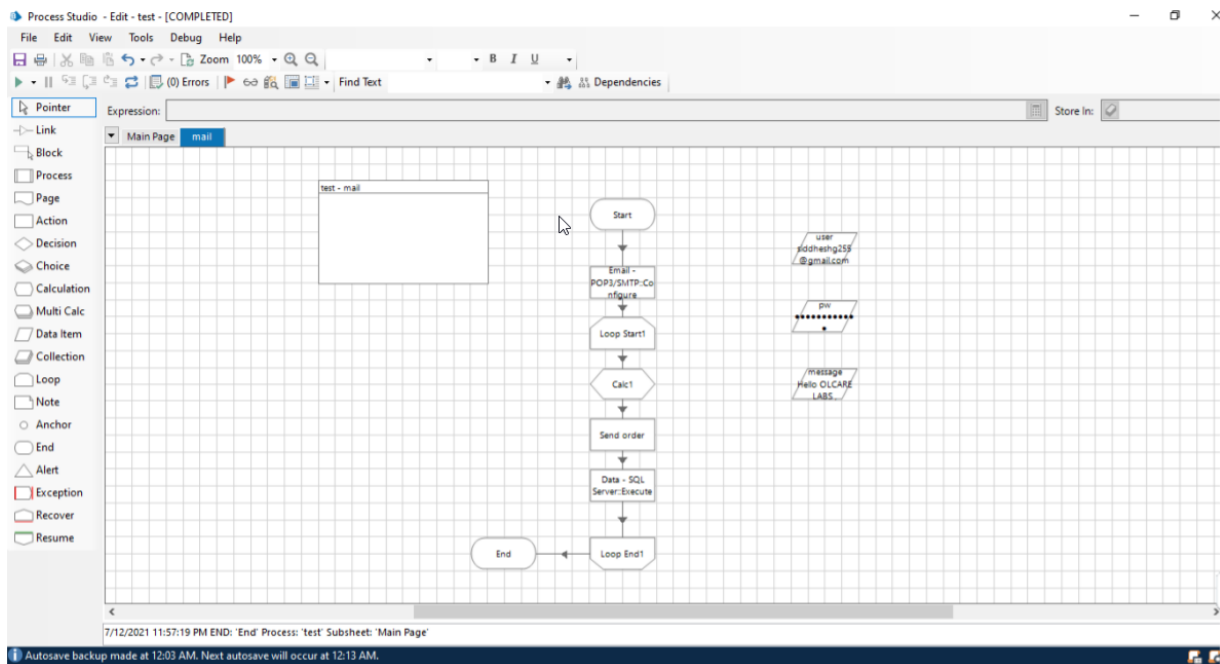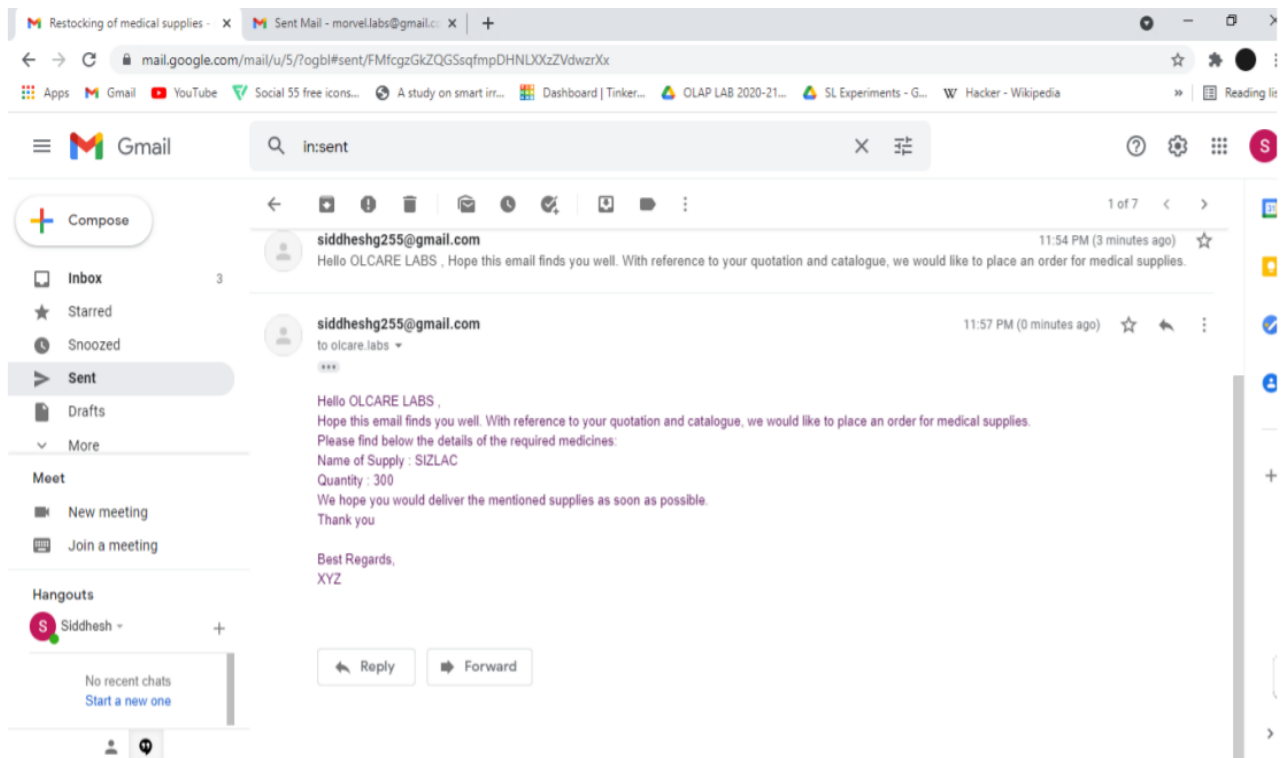
Figure 5: Order placing automated email
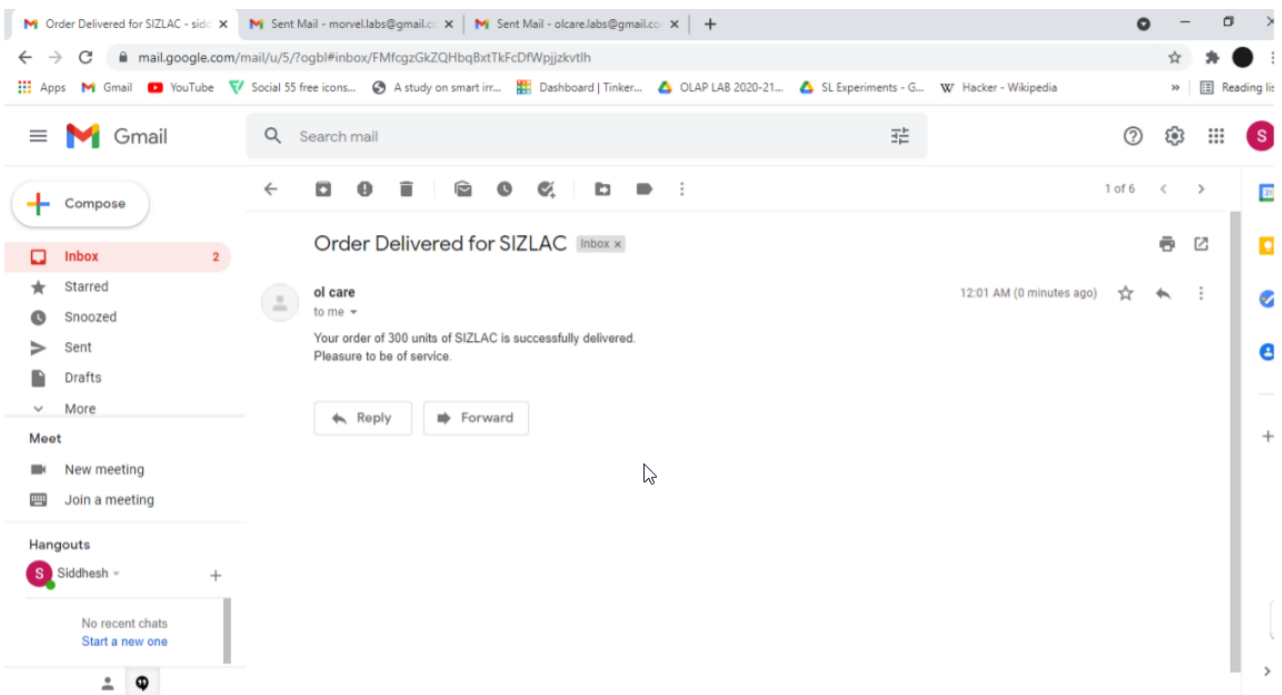


Figure 6: Order Delivered email

Figure 7: Product table



Figure 8: Manufacturer table

Figure 9: Distributor table

# Summary

The existing supply chain framework has a lot of shortcomings and we believe these are mainly because of the human management of processes. So, we have proposed a novel supply chain management framework in the healthcare sector, using Robotic Process Automation. By programming BOTs to automate certain processes in a system which were previously handled manually, we can overcome the several shortcomings in the supply chain management system, such as frequent human errors, excess delay, inaccuracies, etc. Automating the key processes, such as Vendor Selection, Vendor on boarding, Inventory Management and Order Processing with the help of RPA Tool, can help us make the system more reliable and easier to implement.

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# Publication

Submitted in below international conferences and waiting for peer reviews

1. Paper entitled **"Automation of Supply Chain Management for Healthcare"** is presented at **"3RD International Conference on Deep Learning, Artificial Intelligence and Robotics, (ICDLAIR) 2021"**

2. Paper entitled **"Automation of Supply Chain Management for Healthcare"** is presented at **"The 21st International Conference on Intelligent Systems Design and Applications"**

3. Paper entitled **"Automation of Supply Chain Management for Healthcare"** is presented at **"Robotics and Computer-Integrated Manufacturing"**