MASTER OF TECHNOLOGY - INTELLIGENT SYSTEMS
2020

INTELLIGENT SOFTWARE AGENT

FINAL PROJECT1 REPORT

Customer Support Automation

Team members:

Zhan Sheng (A0215253N)
Wu Jingxuan (A0215262N)
Lakshmi Subramanian (A0215255L)
Yalavarti Dharma Teja (A0215457A)

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1. Executive Summary

The rise of Robotic Process Automation (RPA) has created new opportunities for businesses to lure existing and gain prospective customers. The benefits that RPA provides is aimed at offering high quality customer experience.

According to Microsoft, 54% of customers have higher expectations for customer service today compared to one year ago.[1]

The customer service and the experience your customer gains represents your brand image, mission, and values. It has always been a key business differentiator. Recent technology advancement has expanded customer choice offering better customer service. Hence, as a consequence, companies started renewing their policies for their valuable customers.

Retaining a customer is very important. An increase in customer retention for only 5% can incur a profit of at least 25%. This happens because a repeat customer has more trust towards your brand and product/service and are highly likely to spend more with the brand they trust. Customer experience now became company-wide responsibility. From c-suite to IT, brands are placing customers at the center and design processes and communication for improved customer experience. [1]

Research has revealed that automation can significantly enhance the customer experiences.

Companies with a vision towards the future are experimenting with the latest digital tools to provide value-added solutions to their valuable customers or clients. While researching/studying the customer journey, they mark/highlight the ‘make’ or ‘break’ moments in the total journey. Companies try to find the pain points of the customer and try to make their service more customer-friendly to attract them.

Customer experience is mainly about convenience. Voice and chat assistants are already helping consumers to solve their day-to-day queries. From a company's perspective, RPA helps in dealing with customers on a range of predictable, repetitive, tedious and mundane requests. This increases the employees productivity in work and gives them sufficient time to work on value-driven projects that are associated with creativity, innovation, problem-solving, connecting with customers and developing the customer experience.

2. Project Objective

The entire idea of the project revolves around caring for the customer. As we all know, with the right use of modern technologies, it is possible to achieve a higher level of customer care.

Robotic process automation (RPA) is one such technology that is focused on improving business workflow / processes efficiency and workforce productivity. By integrating the RPA applications in customer service, the organizations can automate several routine and mundane tasks that are time-consuming and labor-intensive.

Hence, we want to use our RPA tool to achieve the following objectives:

1. Customers can update information by emails.
2. Customers can update information through dialogue robots.
3. Implement the function of Zoom meeting to automatically create and notify customers, based on the time given by the customers.

3. Background & Introduction

With the improvement of robotic technology, robotic process automation can be applied into many fields. It focuses the attention of employees on higher value-added activities, which will improve the company's business indicators and make employee's work more efficient. In addition, RPA robots release them from repetitive and tedious tasks and focus on more interesting and challenging tasks to improve employees' job satisfaction. By handing over

tedious, monotonous, and large-scale work to RPA robots, technicians and employees can spend more time improving their professional capabilities. [2]

Sometimes the back office processes hinder the business processing speed. Employees manually entering forms into the system or copying data between systems will affect your service speed. RPA robots can work fast and non-stop. In the meanwhile, RPA robots can reduce human error and improve data quality, which makes analysis more reliable.[2]. According to estimates by international RPA suppliers, the application of RPA can save companies up to 75 percent of their costs [3].

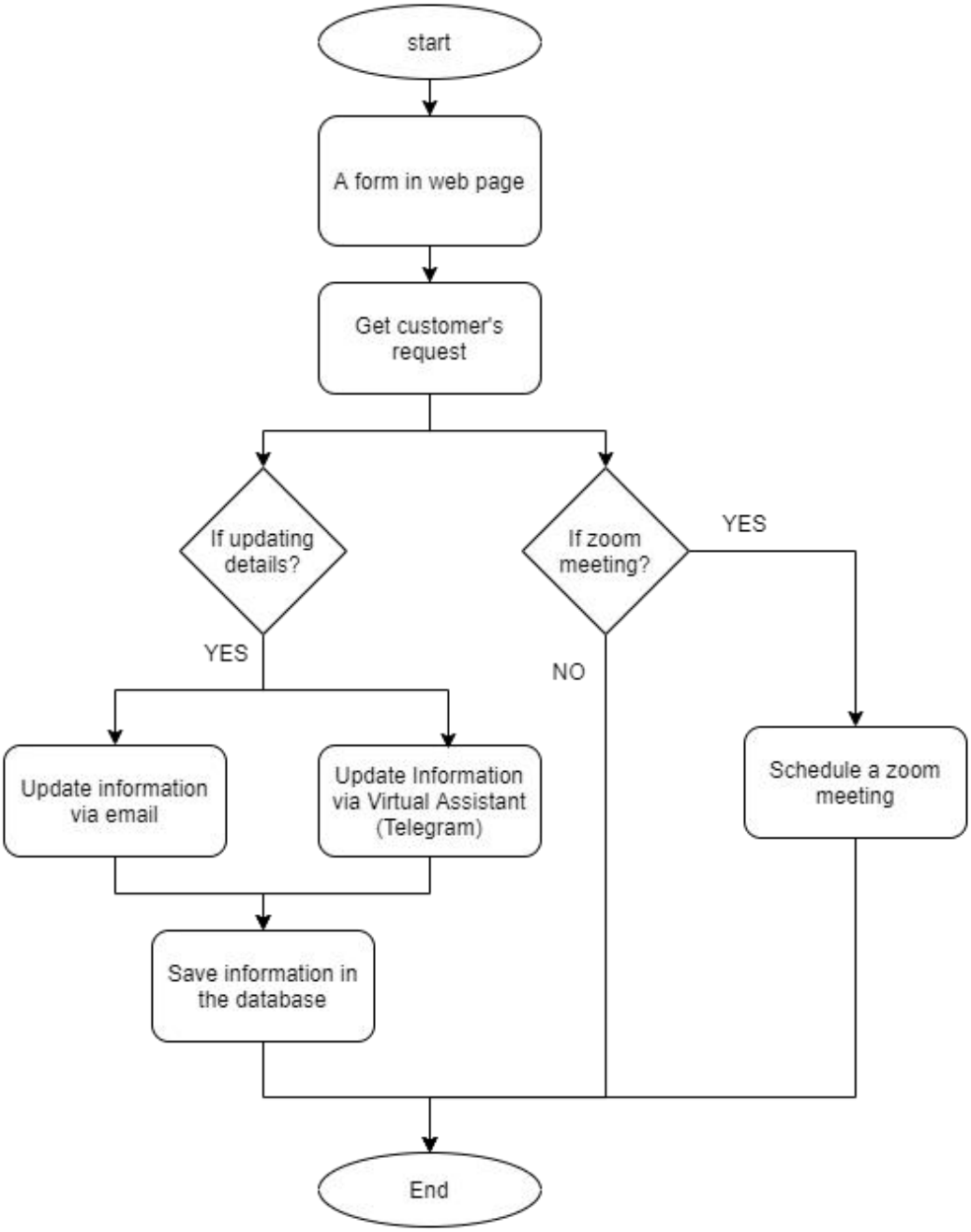

Figure 1: The whole processing of this project

As figure 1 shown above, in order to help the company increase working efficiency and decrease the cost, the Customer Support Automation project was designed and created. It contains the functions of obtaining customer's information through the user's filling out the form in the web page, getting the email of the relevant subject from the mailbox and reading the data of the excel attachment, updating customer's information data in the database and

scheduling a zoom meeting if receiving the user's requirement and informing user the meeting information by email.

In addition, a virtual assistant based on Telegram was implemented. It helps customers update their information in the database in an easier way.

4. Methodology

The project was mainly done by UiPath, DialogFlow and TagUI. It achieved zoom meeting scheduling automation and the information updating based on email or virtual assistant with Telegram.

4.1 Email Automation

The email automation function was done by UiPath. After receiving the emails, the RPA robot starts to work. It reads the emails to check if the subject line is “update_details” or “zoom_meeting”. If the subject line is “update_details”, the robot will check if the attachment is added and if the account verification, four digit verification and the FIN number verification are successful. If not, the robot will send customers an email to inform them of the information they need to provide. If yes, the robot will update the information details into the database as per customer requirement and send a confirmation email to the customers.

Another situation is that if the subject line is “zoom_meeting”, the RPA robot will download the attachment and obtain the meeting scheduling details in the attachment. Then the robot will schedule a zoom meeting as per customer requirement and send an email with the meeting time and link to the customers. The whole processing of the email automation is shown in figure 2 below.

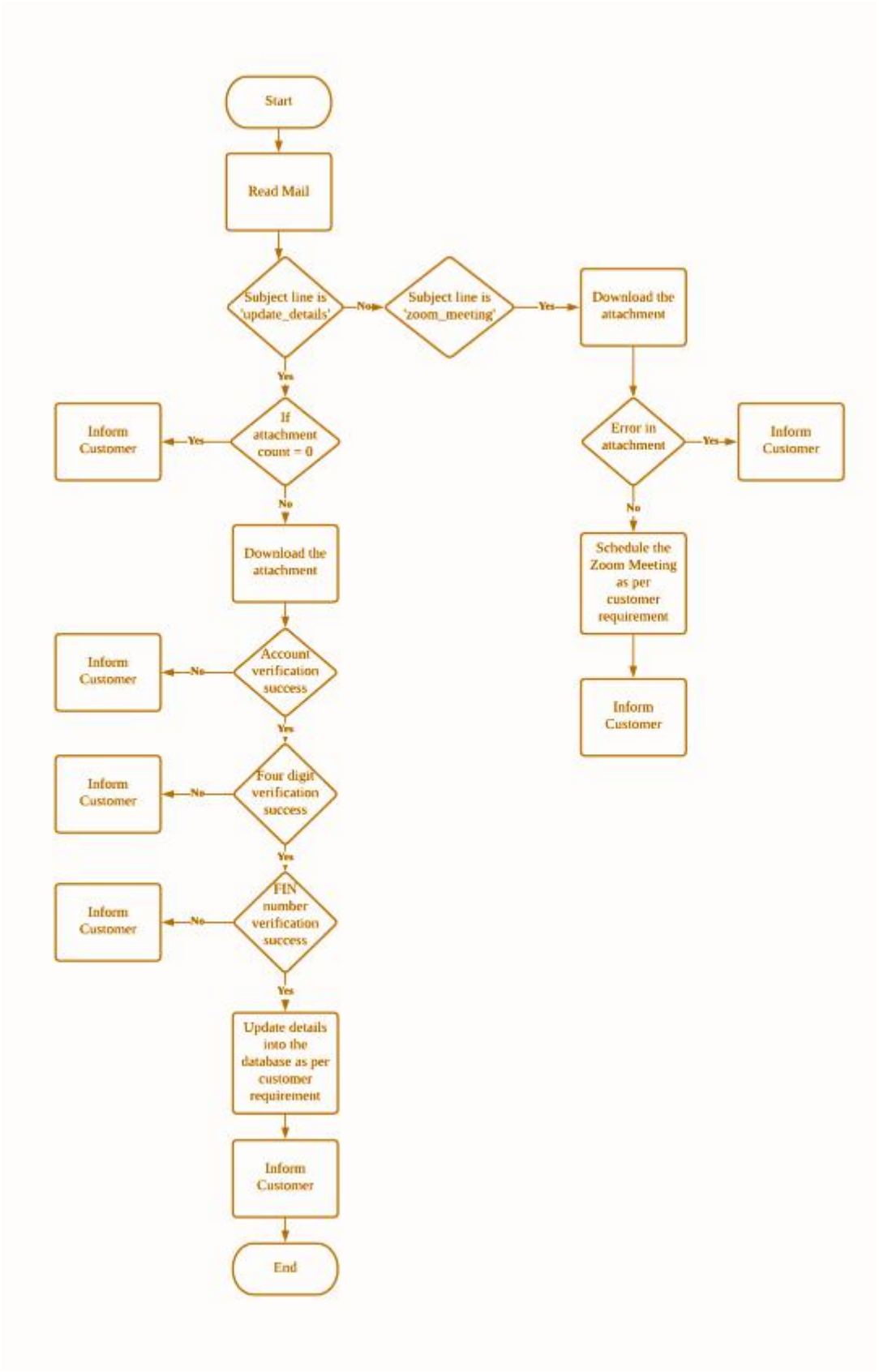

Figure 2: The whole process based on UiPath

The zoom meeting scheduling automation was implemented based on the

UiPath. To get more details in the zoom automation section, the working flow is shown in figure 3 below.

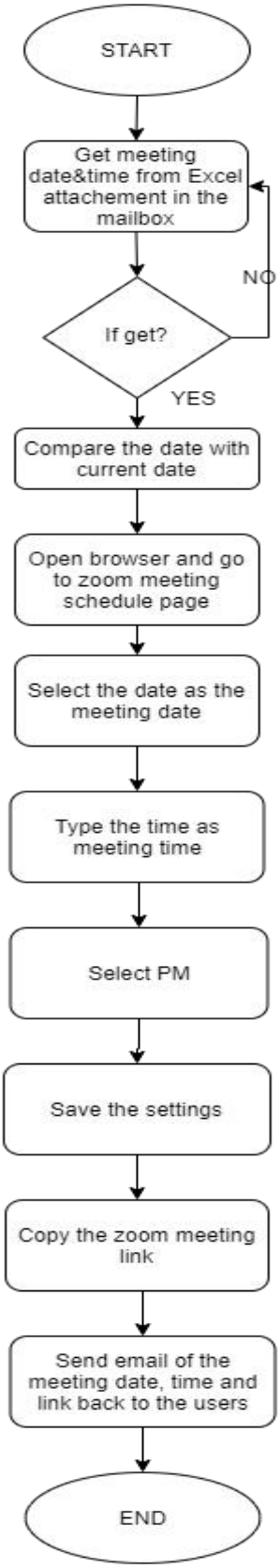

Figure 3: The processing of zoom meeting scheduling automation

As figure 3 illustrates, once the RPA receives the email which contains zoom_meeting attachment and extracts the date and time in Excel file, the RPA starts to work. It compares the meeting date the users want with the current date and selects the meeting date in zoom meeting scheduling website. Then the RPA types the meeting time and after that, it clicks the “Save” button in the webpage to save the meeting schedule and copy the zoom link. The meeting date, exact time and link details will be sent with an email template to the users.

4.2 Virtual Assistant

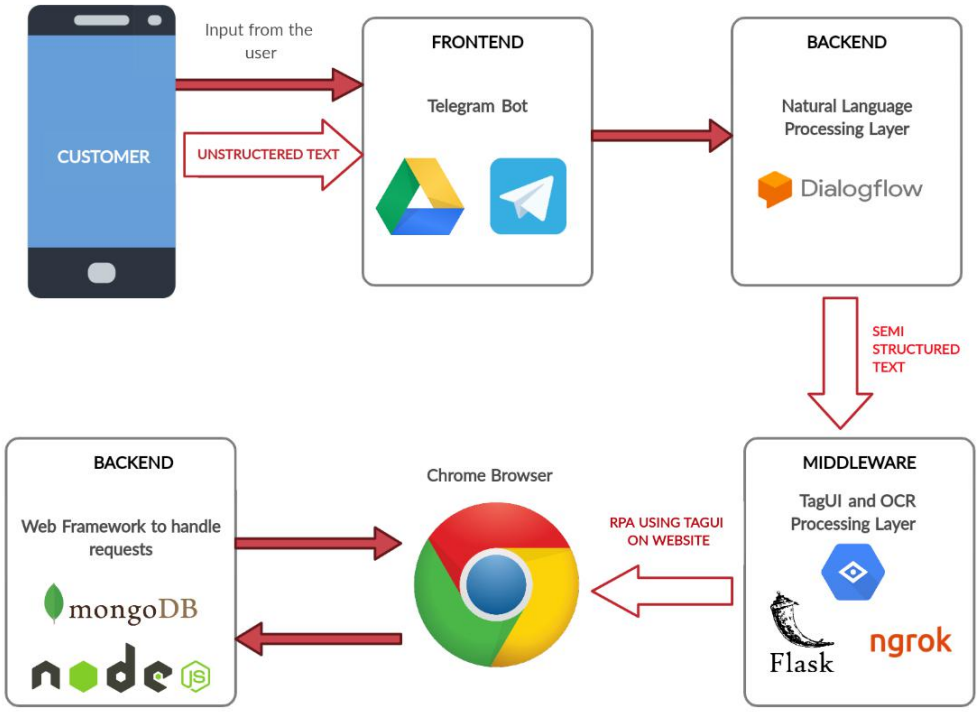

Figure 4: The processing of virtual assistance

Alternatively, requests for updating fields can be handled with the help of a virtual assistant, a bot which can collect information from the front end user and deliver it to the back-end for checking and updating on verification. Here, we have employed a bot on telegram which will communicate with the user to collect, Account Number, the requested change in field, example (phone number, address, name), personal security code and image of their NRIC/FIN Card. For the current release, only the FIN cards are handled for details like

name, DOB and FIN Number extraction using Cloud Vision OCR.

The user inputs the data in telegram bot and uploads the image into a Google form which is connected to Google drive, the details are processed using DialogFlow NLP to get the exact entities required for the updating process. The request fulfillment is handled from dialog flow in the local system using ngrok and flask. After the request is received by the local server, a python script is used to fetch the latest image from G-Drive and downloads into local for processing, then using Cloud Vision API we extract the required text along with details given by the user and compare it against the database to verify and initiate the update process. A model portal where the customer care representative checks and updates the details is written in JavaScript and the back end database is hosted on cloud mongoDB. TagUI is used to perform the web automation of retrieving details from the portal for a given account number and also for updating the records based on user request in chrome.

5. Results & Analysis

In this section, the testing result of this project and analysis will be discussed.

5.1 Email Automation

The email automation functions were tested with several use cases. Customers would receive different email responses from the RPA bot based on the received email from them.

5.1.1. The customer sent an email with the subject line “update_details”.

Case 1: The customer sent the email without attachment.

When the customer sent an email with the subject line “update_details” and without the attachment, the RPA robot would send an email to the customer as figure 5 shown below.

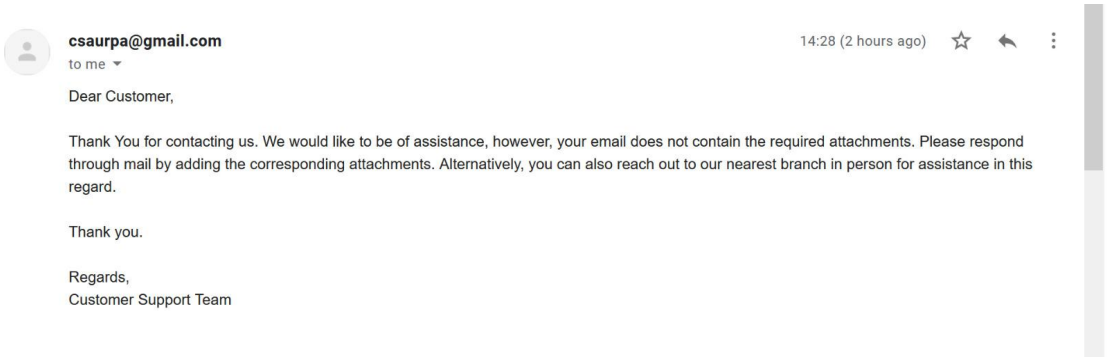

Figure 5: The screenshot of email reply with no attachment

Case 2: The customer sent the email with an incorrect account number.

When the customer sent an email with the subject line “update_details” and with incorrect account number, the RPA robot would send an email to the customer as figure 6 shown below.

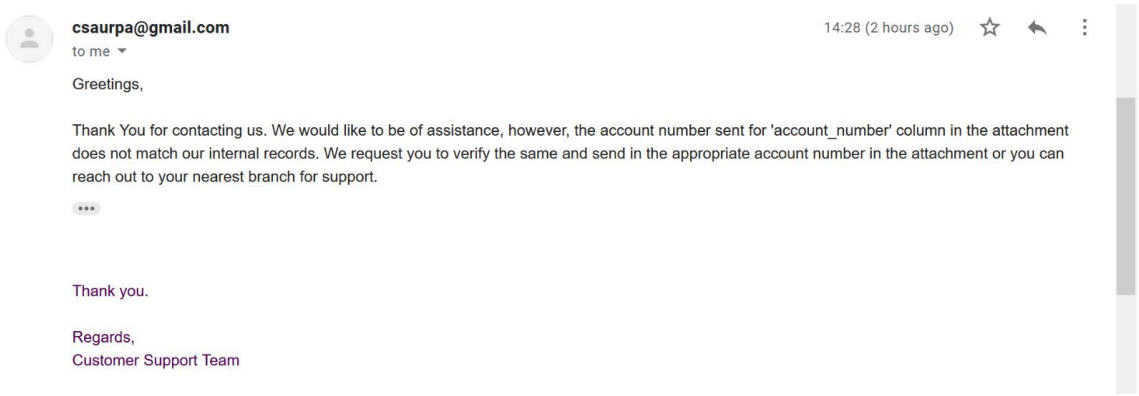

Figure 6: The screenshot of email reply with incorrect account number.

Case 3: The customer sent the email with an incorrect last 4-digit.

When the customer sent an email with the subject line “update_details” and with incorrect last 4 digits, the RPA robot would send an email to the customer as figure 7 shown below.

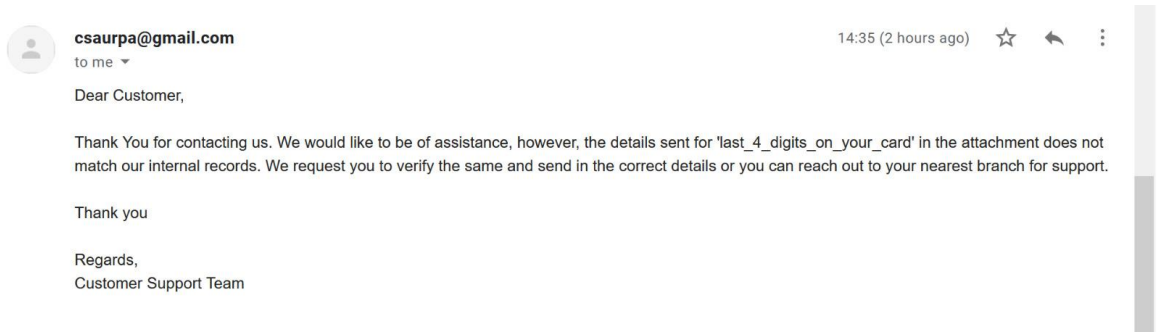

Figure 7: The screenshot of email reply with incorrect last 4-digit.

Case 4: The customer sent the email with an incorrect FIN number.

When the customer sent an email with the subject line “update_details” and with incorrect FIN number, the RPA robot would send an email to the customer as figure 8 shown below.

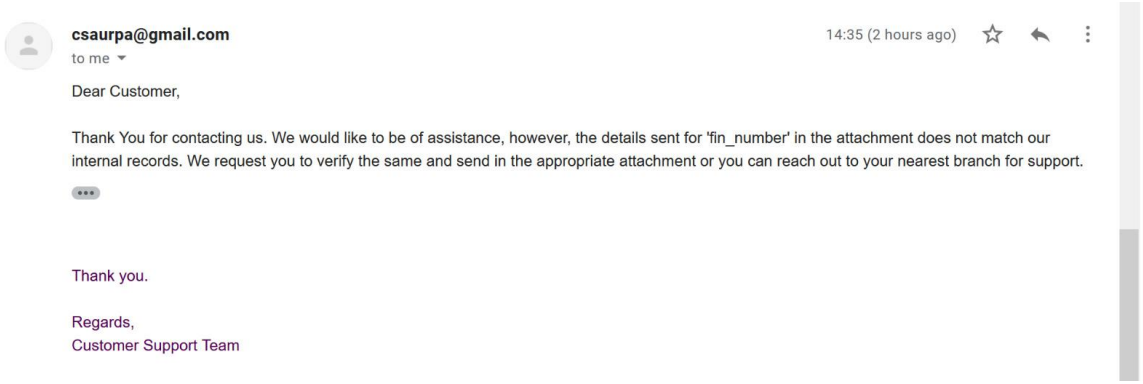

Figure 8: The screenshot of email reply with incorrect FIN number.

Case 5: If all the information and format are correct, the information details would be updated in the database successfully. The RPA robot would send an email to inform the customer as figure 9 shown below.

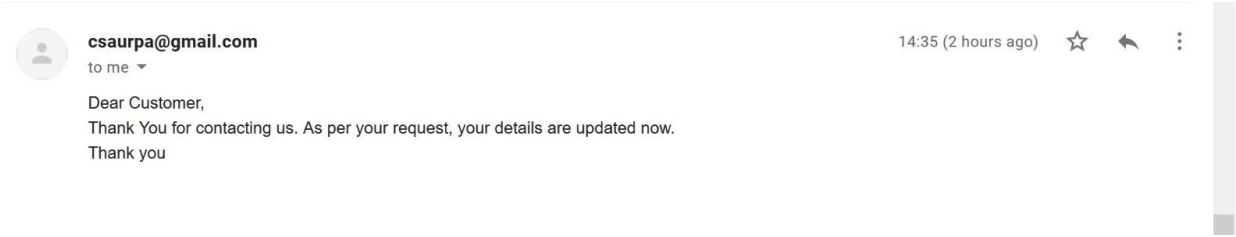

Figure 9: The screenshot of email reply with successful information updating .

5.1.2. The customer sent an email with the subject “zoom_meeting”.

The automation of scheduling zoom meetings helps the boss to automatically set the meeting time and notify the customer by email after obtaining the specific date and time that the customer wants to. The RPA robot helped to schedule a zoom meeting as the specific time and send the meeting details back to the customers. The customer will get the reply as figure 10 shown below.

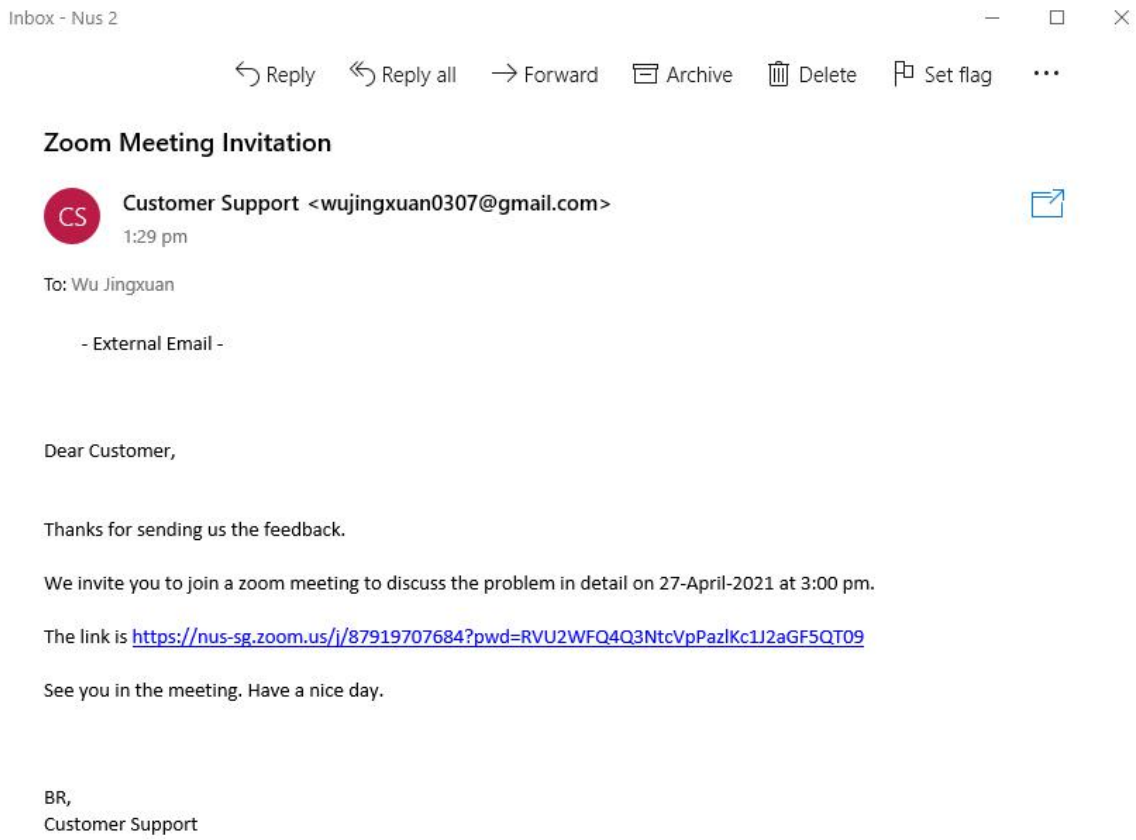

Figure 10: The meeting details the customer got.

For an average human, to handle just six emails pertaining to the above mentioned scenarios/cases, it would take around a minimum of 15-20 minutes. However, the RPA bot here was able to handle the same and completed the task in under a minute, and more importantly, with 0 errors which would improve the customer experience and enhance their relationship with the company.

Automating and scheduling zoom meetings will provide the customer the flexibility to connect with the customer support team in their flexible/chosen time slot thereby reducing customer wait/hold time on the call to contact and speak to a customer support agent.

Moreover, from the business perspective, the utilize of zoom meeting scheduling automation function saves the boss more time to handle other businesses and also as the upcoming zoom appointments with the customer

are available, they provides a clear picture on the staff requirement to handle the specified volume of customer zoom sessions at any given time thereby leading to customer satisfaction.

5.2 Virtual Assistant

The virtual assistant gets the user inputs and delivers it to the back-end using dialog flow, which triggers a series of steps involved in the update process. First is verification of the account number and personal security code and then verifying if the image uploaded is having the same name and FIN number as given in the database, based on this if there is a perfect match then the TagUI web automation for updating records is performed.

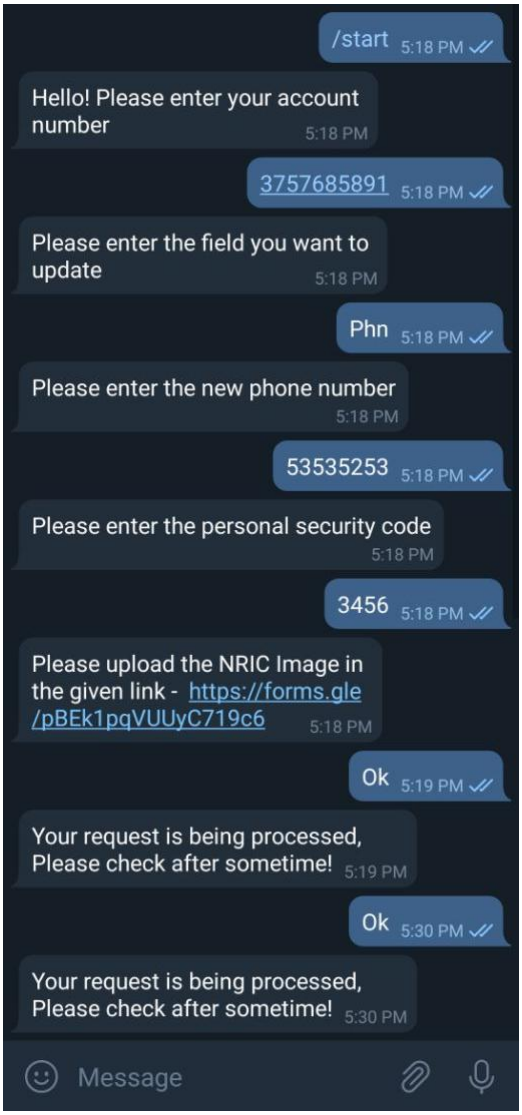

Figure 11: Telegram Conversation

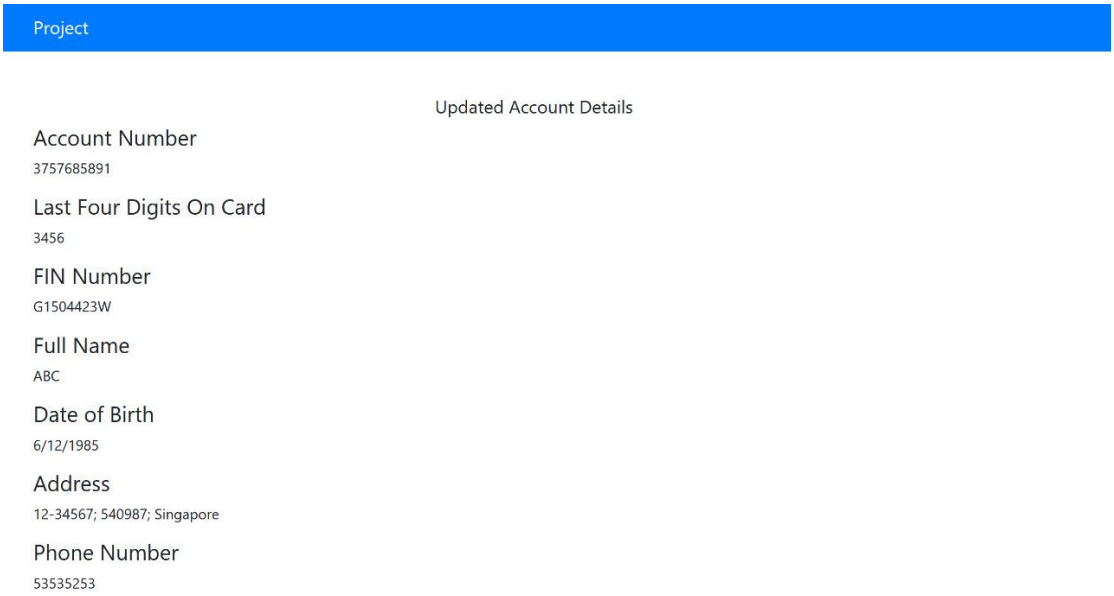

Figure 12. Updated records

6. Limitations & Future Work

(1) The email automation processing only supports G-mail yet due to the time limitation.
(2) The zoom meeting scheduling function only achieves the date and time adjustments.
(3) The authenticity of the image is also to be verified, because the image is prone to be counterfeited.

If we had a longer time frame to work on this project, we would have worked upon the following points of improvement:

1) Automate sending and receiving emails based on multiple mailbox platforms.
2) Make more adjustments to the zoom meeting arrangements, such as naming the meeting according to different meeting themes.
3) Virtual Assistant will give the outcome of the update request as a message or as an email to the user. Let the dialogue robot become more intelligent, which can recognize the customers' multiple intentions.

7. Conclusion

The whole team spent a great time on this project. The project was done as expected. The RPA robot can detect the key words in the subject line in the mailbox and make different actions, including sending error or confirmation messages to customers, updating customers' information in the database, and scheduling a zoom meeting for customers. In addition, the virtual assistant provides an easier way to update customers' information in the database.

As the development of technologies, robot processing automation is more common in our lives and work. It is a good assistant to facilitate our work, and does not require expensive system maintenance. In the future, more RPA functions would be added into this project to make office work easier and more efficient, which allows employees to spend more time improving their professional capabilities.

References

[1] Anand Mahajan, How can RPA benefit your Customer Service Team, November 22, 2019 [online]
URL:https://customerthink.com/how-can-rpa-benefit-your-customer-service-team/

[2] James Maguire, Top 10 Benefits of Robotic Process Automation (RPA), April 13, 2020 [online]
URL: https://www.datamation.com/artificial-intelligence/benefits-of-rpa.html

[3] Bill Cline, Michael Henry, Cliff Justice, Rise of the robots [online],
URL:https://assets.kpmg/content/dam/kpmg/pdf/2016/05/rise-of-the-robots.pdf

Appendix A: Business Value

1. Reduced costs
It is important to achieve a reduced level of cost which results in a greater level of efficiency and Robotic Process Automation (RPA) is one of the best options for cost savings. When a customer service representative uses a system powered by RPA, the average handling time (AHT) with the customers is decreased along with the processing costs.

2. Simplified desktops
Customer service representatives often have to deal with multiple applications, switching from one application to another, or even copying the same information among several systems. RPA can best assist the agent by preloading the required customer context and pulling all the necessary information from multiple applications as and when needed.

3. Improved processes
Using RPA not only decreases the errors and creates efficiency but it also improves the process predictability, enforces compliance and adheres to the regulations. Basically, RPA can ensure a smooth recording of all the changes/ modifications in your system. Moreover, the process automation robots continuously work to perform necessary checks in the background, and keep your workflows updated.

4. Better experiences
Customer service representatives, at times, spend a huge amount of time trying to search and track customer information across multiple systems. RPA can take care of such tasks by quickly looking up the process workflow thereby helping the representative in reducing lead times and to offer better support experience.

5. Easy deployment
Deploying a Robotic Process Automation(RPA) solution can be relatively quick and is like adding a new layer over your existing infrastructure that will maximize its value. In order to implement RPA, enterprises need not mobilize resources. Moreover, there’s no need to remove or replace the assets that are already in place.

Figure 1 shows the business process of this customer support automation project.

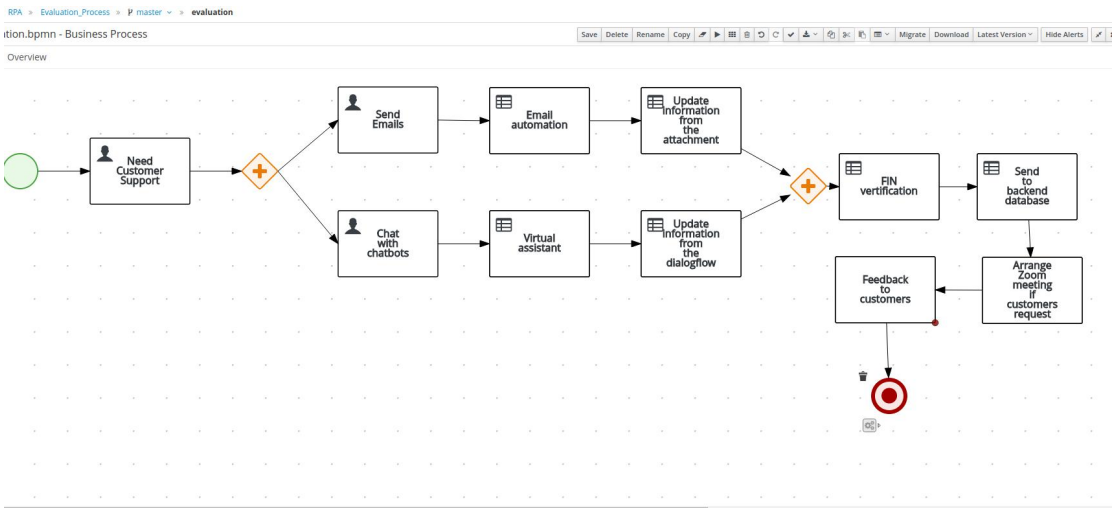

Figure 1: Business Processes

Appendix B: User Guide

Common Requirements:

1. Operating System: Windows (Windows 10 used)
2. Install Nodejs from the web link: https://nodejs.org/en/download/ (If not already installed. This is a one-time task.)
3. Open Command Prompt, type ‘npm install’ and hit enter (First time only)
4. Download the project from the GitHub link: https://github.com/lakshmi4296/ISA-CustomerSupportAutomation
5. Extract the project folder
6. In Command Prompt navigate to the ‘Account’ folder

Figure 2: Commend Prompt screenshot 1

7. Type ‘npm run start’ and hit enter (This should start running the server and connect to the MongodB

Figure 3: Commend Prompt screenshot 2

8. You can use the link: http://localhost:5050/api/accounts/ to see the current data stored in MongodB database

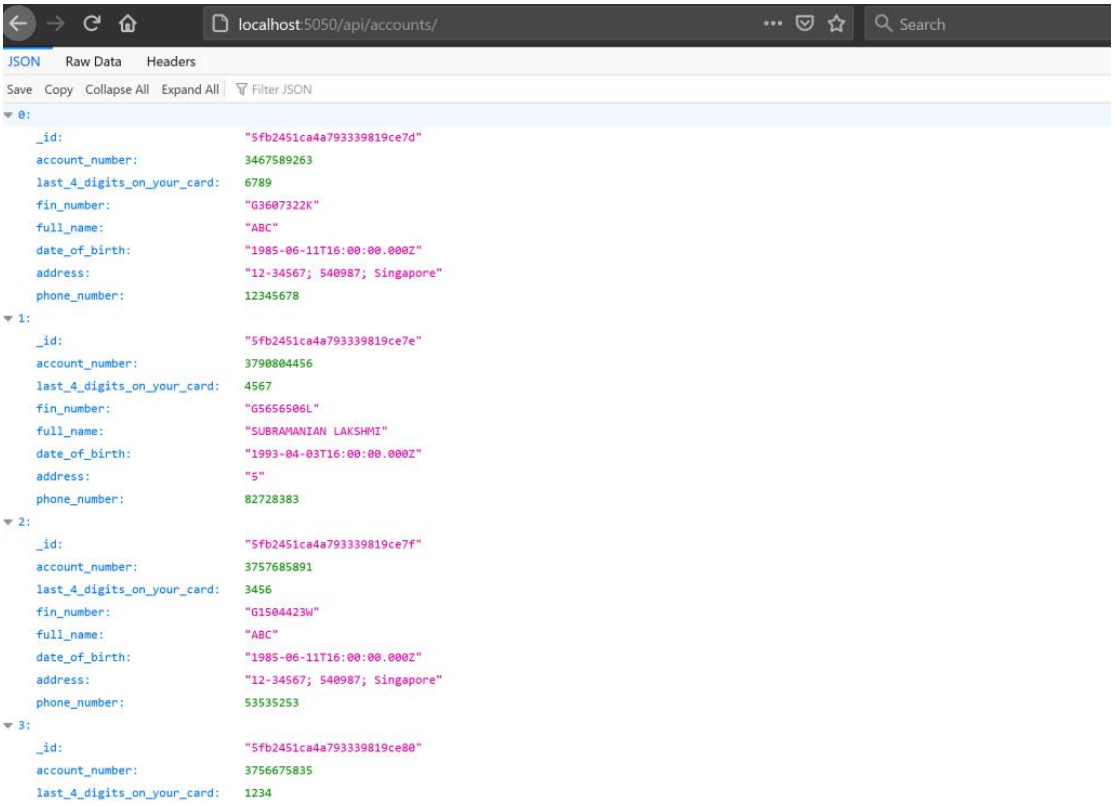

Figure 4: Database

Email Automation Requirements:

Please ensure you have the following ready before proceeding with the steps below.

1. Software: UiPath, Firefox Browser (Version 83.0 (64-bit) used)
2. Plugin: UiPath Firefox Plugin

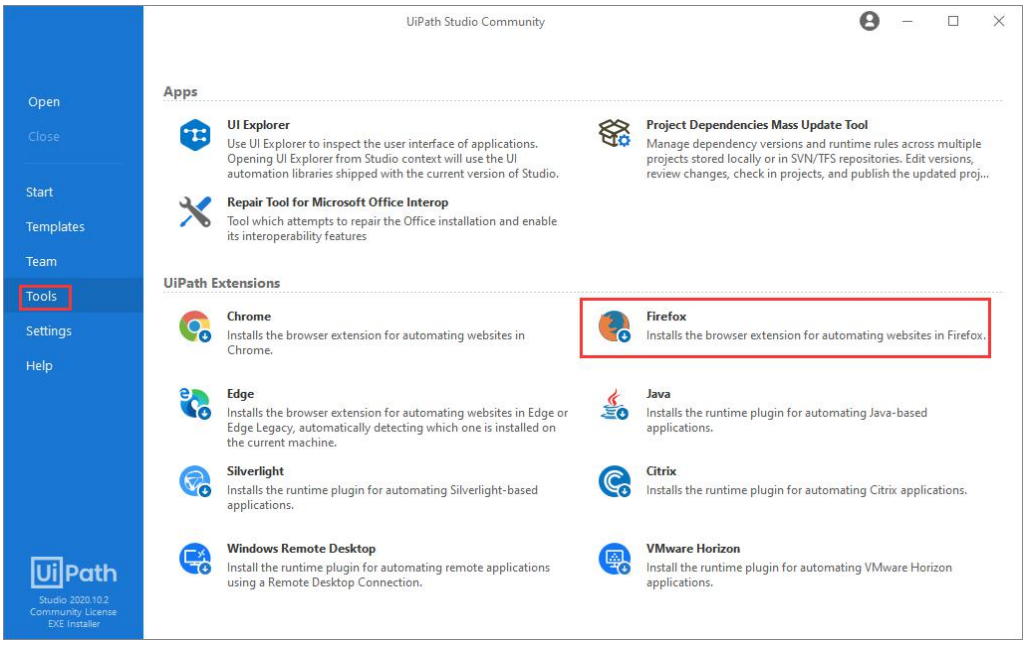

Figure 5: UiPath setting

3. A Zoom account should be signed in. Sign up for a zoom account (if not already available) and Sign in with your email address and password on Sign In - Zoom, click the “Stay signed in” box below the “Sign In” button.

Figure 6: Zoom setting

4. Two dummy G-mail Accounts to simulate the ‘customer account’ and the ‘customer support team’ account.

5. Make sure that the ‘Less Secure App Access’ under ‘Security’ configuration of the G-mail is turned ‘ON’

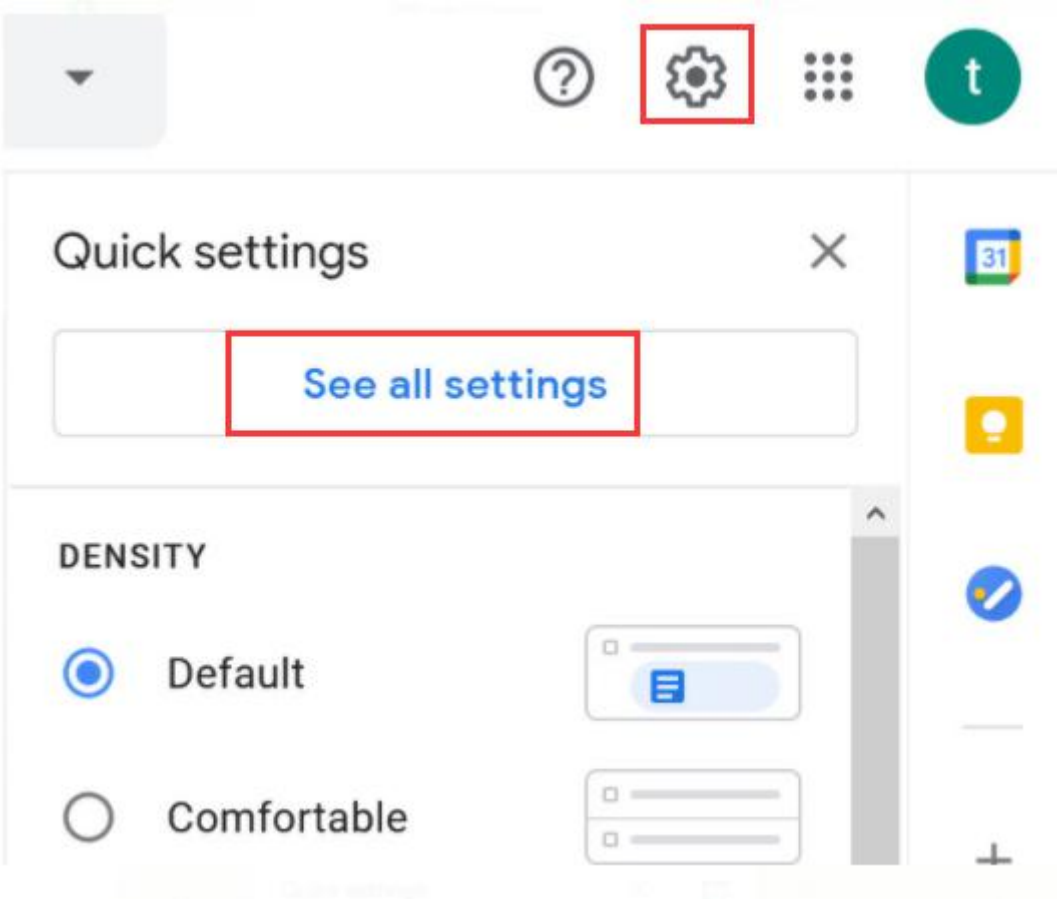

Figure 7: G-mail setting 1

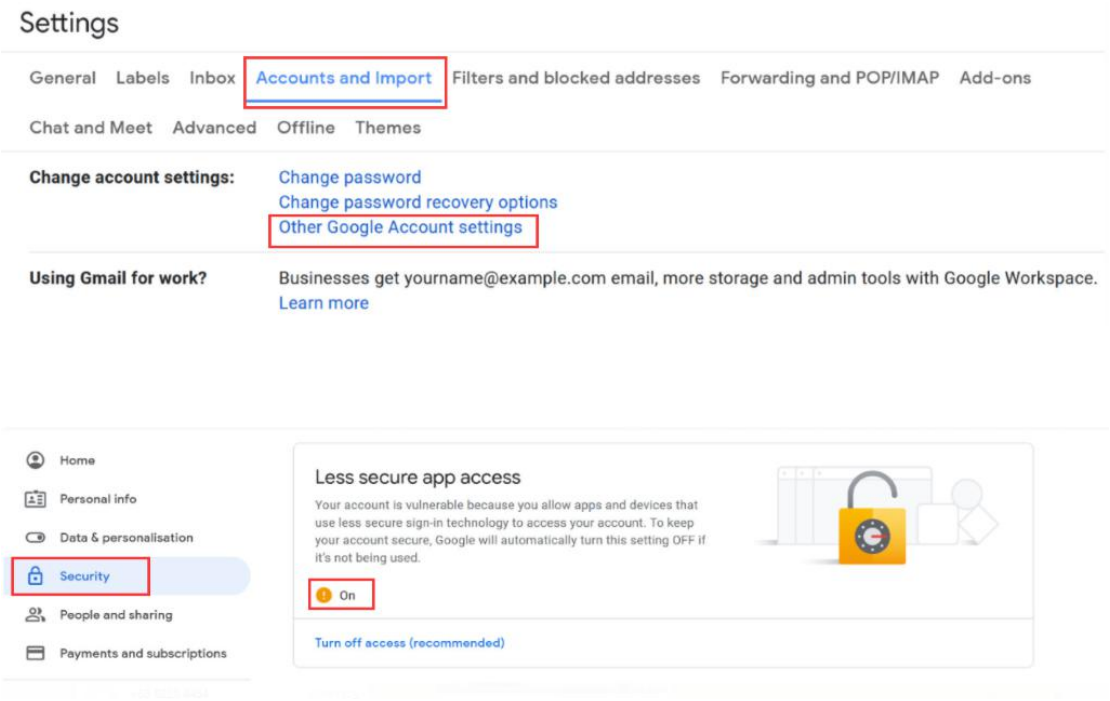

Figure 8: G-mail setting 2

6. Send a few mails from the ‘customer account’ to the ‘customer support team’ G-mail account which should follow the below mentioned requirements for the RPA bot to action upon.

Email Requirements:

i. Subject line of the email sent should be either ‘update_details’ (to get the details updated in the database) or ‘zoom_meeting’ (to request for a zoom meeting appointment with the customer service executive). Other subject lines are ignored by the bot.

ii. In order to request for updating details, fill the details in ‘sheet 1’ of the file ‘data.xlsx’ which is under the path ‘SystemCode > Customer_Support_Email_Automation > Data’ and use the same as attachment for the email being sent to the ‘customer support team’ account

iii. Input data for the fields ‘account_number’, ‘last_4_digits_on_your_card’ and ‘fin_number’. The data entered in these three fields should match the data in the database otherwise the customer would receive mail

stating that the corresponding details are incorrect and hence the update cannot be done.

iv. For the fields ‘full_name’, ‘date_of_birth’, ‘address’ and ‘phone_number’, edit the corresponding cells only if you wish to update the respective details in the database. If you do not wish to update, leave them as is (with 0 and NR)

v. In order to request for a zoom meeting appointment, fill the details in ‘sheet 2’ of the same file ‘data.xlsx’. Enter the date and time in the prescribed format.

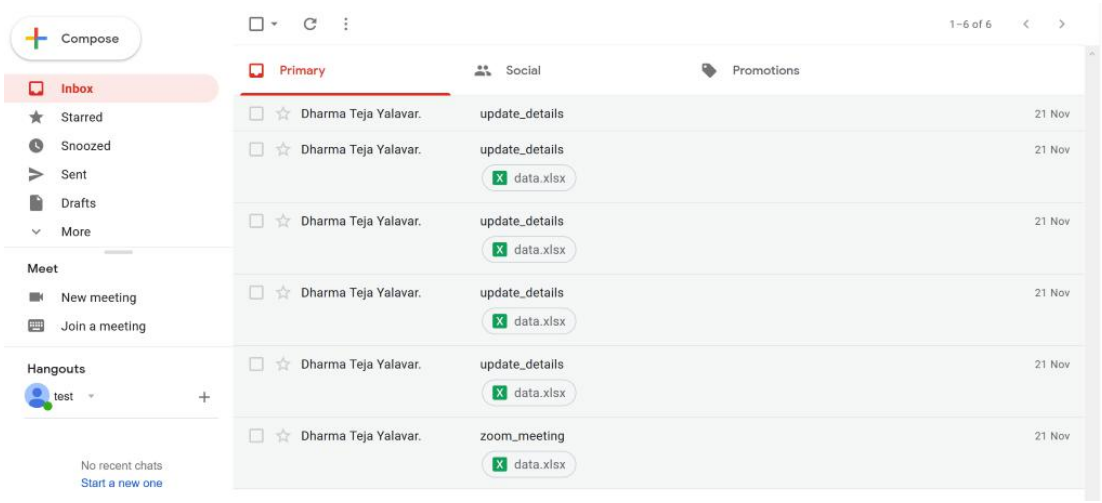

Figure 9: Email receiving examples

Email Automation Steps:

1. Go to the folder SystemCode > Customer_Support_Email_Automation

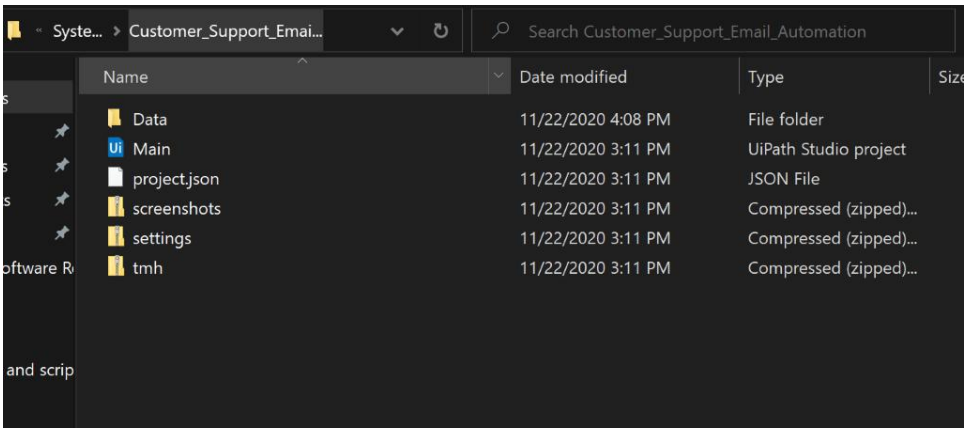

Figure 10: The content of Customer_Support_Email_Automation folder

2. Extract the three Zip files (screenshots, settings, tmh) into the same folder

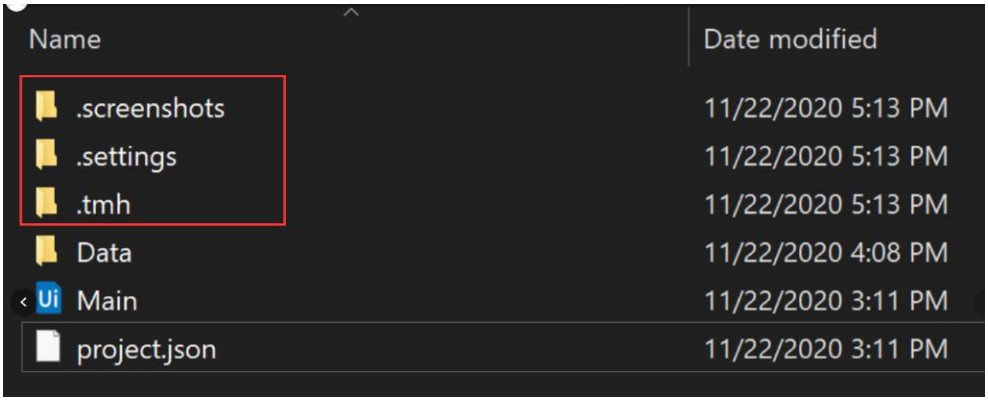

Figure 11: The files need to be extracted

3. Open the project in UiPath

Figure 12: The method to open the project in UiPath

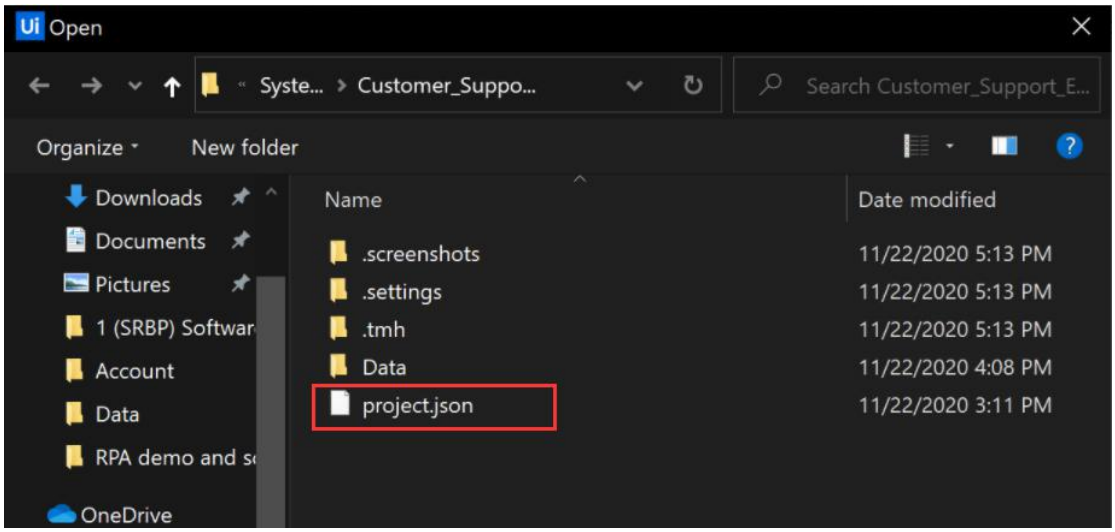

Figure 13: The file to be opened in UiPath

4. Update the ‘Customer Support Team’ Email id and password accordingly

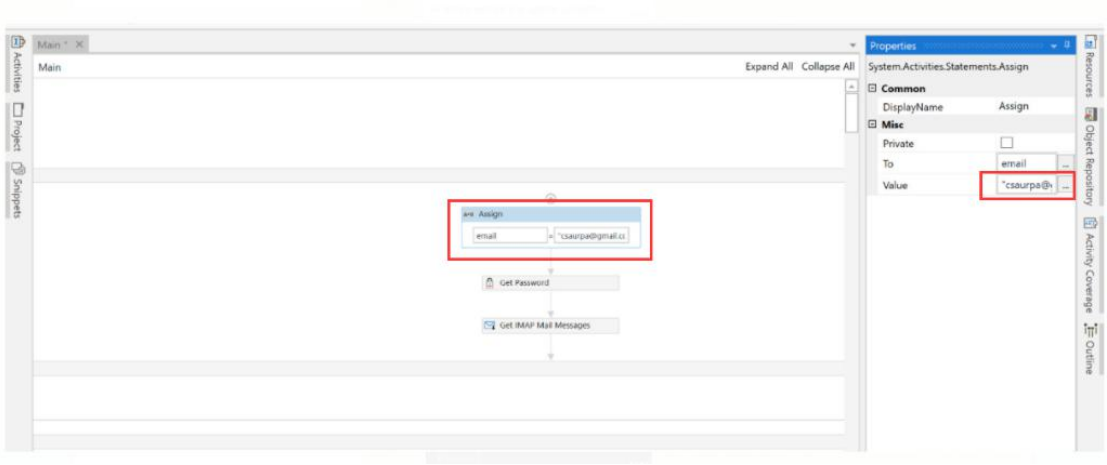

Figure 14: The email to be updated

Figure 15: The password to be updated

5. Run the RPA bot to simulate and view the Customer Support Automation

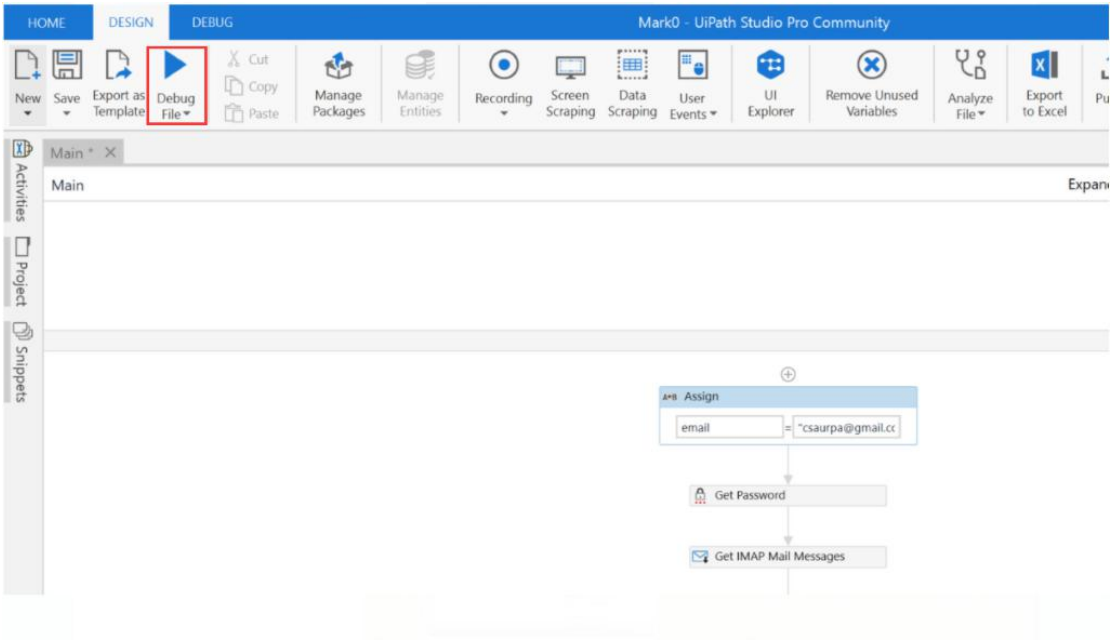

Figure 16: How to run the program

6. Once the execution stops, you can verify the email responses sent by the bot to the customer account

Virtual Assistant Requirements:

- You are using python 3.5 and above (Version 3.7.6 used for development)
- Telegram app has been installed on your android or iOS smartphone.
- You have a registered account on https://dialogflow.com/

Virtual Assistant

Unzip into a location without whitespace eg. folder path names should not contain spaces like “D:/cc rpa/Project3a” it should be "D:/cc_rpa/Project3a”

Once you have installed python, open a command prompt and CD to the project root folder(“<filepath>/SystemCode”).

1. Create a python env. Once created, you should see an ‘env’ folder in your project’s folder

   Use "python3 -m venv env" OR use "python -m venv env"

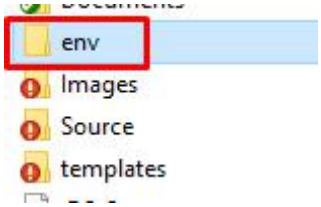

Figure 17: The folder to use

2. Activate the python env. Once activated, you should see (env) next to your command line.

   For Mac: "source env/bin/activate"

   For Windows: "env\Scripts\activate"

3. In the command prompt/terminal CD to the project folder "<your-file-path>/SystemCode”. Enter "pip install -r requirements.txt --user" OR "pip3 install -r requirements.txt". This will install all the required dependencies
4. Once installation is complete, type in "python app.py" and press enter. This will deploy your server locally on your PC.

5. Navigate to "<your-file- path>/SystemCode/Account" and open cmd and type "npm install" and enter, for first time installation.
6. To start the server for the Customer Care UI, run the following in cmd, "npm run start".
7. Download and install ngrok. Open command prompt in the location where ngrok is downloaded, enter "ngrok http localhost:5000". Copy the https link, it should look something like this https://d7edbebd2187.ngrok.io.
8. Go to https://dialogflow.cloud.google.com/ and log in with your account. Proceed to import the DialogFlow agent on DialogFlow. To do this, first create a new agent and give it a name e.g., "CC_RPA_Agent". Once created click on the settings gear icon next the agent name and click the "Export & Import" tab. Click "Import from Zip" and select the CC_RPA_Agent.zip. Type "IMPORT" into the text box and click "IMPORT".
9. Once the agent has been imported and training is done, click on the "Fulfillment" option on the left menu bar. Enable the webhook (If it is not enabled) and copy and paste the ngrok https link on the URL field. Scroll to the bottom and click save. Give it some time to save your settings.

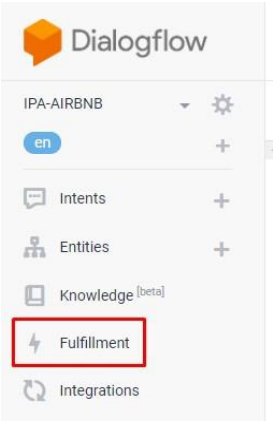

Figure 18: The fulfillment in DialogFlow

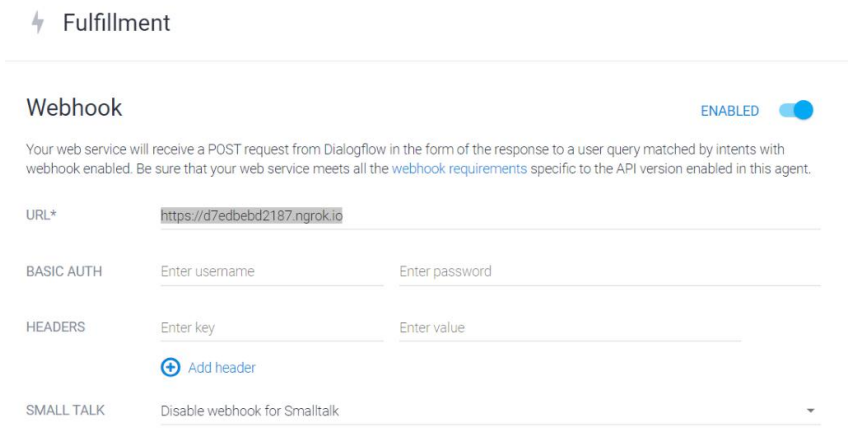

Figure 19: Fulfillment settings

10. Set up the link between telegram and dialogflow. From dialogflow, click Integrations. Then, check the Telegram box. A pop-up will appear, enter the bot_token key and click start. This will integrate the bot and dialogflow together.

Bot Token key: 1455843468:AAG0kVfnJxpjNP6k3kUdJKgyX3RUmzc-Kyk

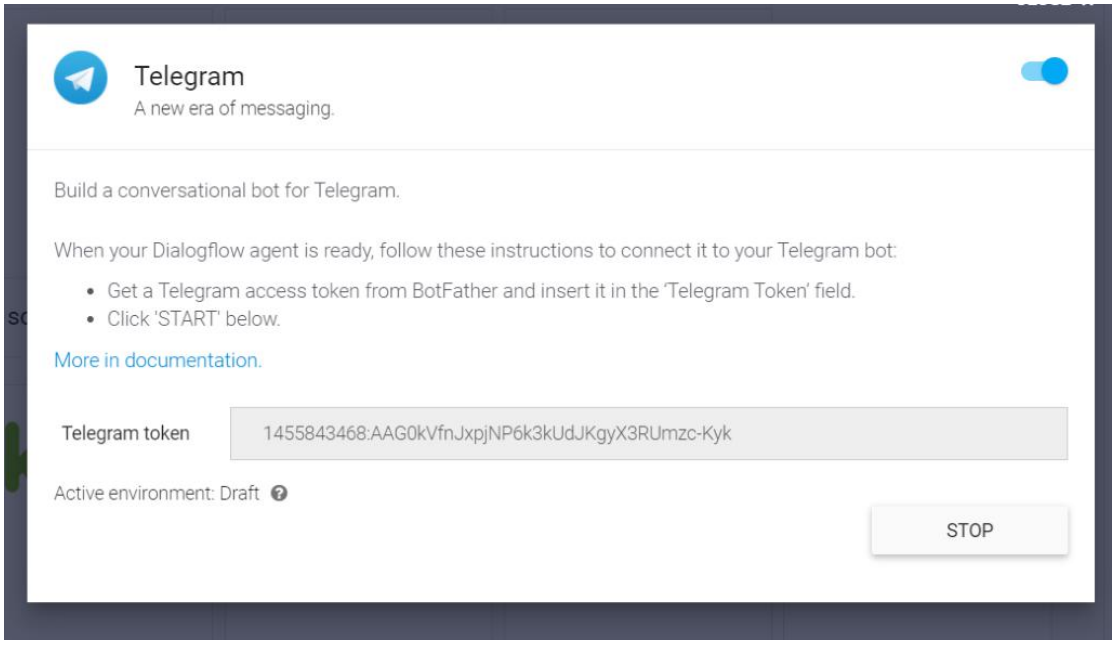

Figure 20: Telegram token

11. Now open your telegram app from the smartphone. From the search bar of your chat page, type "CCRPAbot" click on “CCRPAbot”. A chat window will be created with the bot, click 'Start'.

Temporarily the credentials for accessing G-drive is in credentials.json

which is linked to the google forms owner. The credentials for google cloud vision api is saved as lak_cred.json. These credentials may expire and need to be replaced with valid credentials.

For testing -

Use Account number – 3757685891 Personal Security Number – 3456 and upload the below image saved in your local

Figure 21: Example customer's information

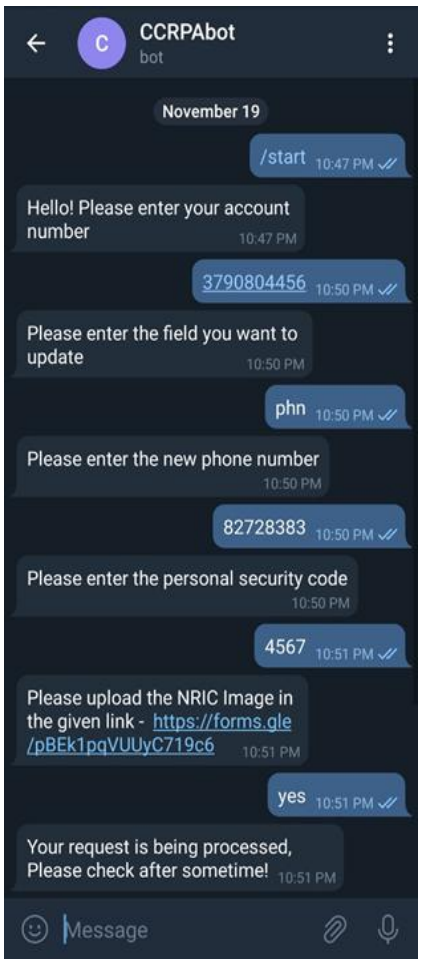

Figure 22: A Telegram usage example

Appendix C: Personal Report

1. Lakshmi Subramanian - A0215255L - e0535345@u.nus.edu

Personal Contribution to This Project

- Setting up DialogFlow Intents and entities
- Integration with Telegram
- Python script for DialogFlow fulfilment
- Connecting to google drive to get the image into the server for image processing.
- Using Cloud Vision for Text Recognition of the uploaded image
- Verification of the uploaded details and the Image upload with details in System
- Implementation of web automation using TagUI to check the details and update the requested details in the System
- Implemented Google OCR in UiPath
- Designed virtual assistant system architecture

What is the Most Useful Learnt

Creating and understanding how a virtual assistant converses with the users to get the user input for updating the details by creating the related entities and intents in DialogFlow which will trigger a chain of questions. We tried to get the images directly from telegram to process in the backend, but it was not a straightforward approach to get the image into DialogFlow and back to the server for processing. Since the response to the DialogFlow is to be given within 5 seconds and image retrieval, OCR and TagUI automation takes around 10-20seconds we couldn't deliver the result of the update request. Alternatively, the bot can trigger an email, we can also have a double authentication check by implementing OTP as a part of the verification process, this will be added in the consecutive versions of MVP.

I have learnt methods to extract required files from google drive and processing the images using cloud vision API. I have also learnt to extract data, navigate through pages and key-in data in web pages using TagUI.

How to Apply the Knowledge and Skills in Other Situations or Workplaces

A lot of daily activities can be automated in the banking domain. The manual process of document verification and data entry can be automated, provided we have a good OCR engine. Apart from banking, RPA/IPA can be used to automate many of the front desk work, and wide range of applications in domains like finance, logistic, retail, healthcare and legal.

Virtual assistants can be employed in various fields for easing the manual work such as scheduling appointments, making phone calls and handling emails. Chatbot can handle user input by effectively utilising natural language processing and extracting data as required. Chatbots can be employed in many organizations in order to reduce the load of customer care operators, the bots can help the customer resolving and answering their simple queries which do not require any human skill/input to answer.

2. Wu Jingxuan - A0215262N - e0535352@u.nus.edu

Personal Contribution to This Project

I did the zoom scheduling automation via UiPath with my teammate Zhan Sheng. I was mainly responsible for the whole processing part, including

1. Creating a zoom meeting, getting the meeting link and details from zoom

2. Sending an email back for the customers with a fixed text template.

3. Taking part in some of the date and time of the meeting scheduling.

4. Combining my work with my teammates' work. In addition.

5. Helping my group mate search how to get a diagnosis info database from DialogFlow.

6. Testing the whole program.

7. Writing parts of the User Guide together with my teammates.

8. Writing the document of background & introduction, the methodology of the email automation part, the result & analysis of the email automation part, and the conclusion part in the document.

9. Adding the report contents, adjusting the structure of the report, correcting spelling errors, and rearranging the report format.

What is the Most Useful Learnt

For me, the most useful parts are:

1. How to use UiPath functions to make RPA projects to save time and cost.

2. How to use UiPath to make email automation, excel automation and web automation.

3. The most important thing for companies or businesses is to find users' pain-point. Only when the business gets users' pain-point can they obtain more business value.

4. How the RPA can help people's work which helps me to get the idea of this project.

5. How to use TagUI to fetch information on the websites.

How to Apply the Knowledge and Skills in Other Situations or Workplaces

The utilization of UiPath can be applied into many fields. The web automation or email automation can be used to fetch information details automatically. For example, let each technician or person in charge report the use of materials and send emails according to a fixed format. The RPA can extract materials or engineering information to form an engineering quantity pricing table, and then send it to the financial department for review. RPA can increase accuracy and save time than using manpower.

TagUI can be used to fetch data from websites. It can be used, for example, to get the public's evaluation of a certain movie from movie review websites, and to find detailed information about certain items on shopping websites, etc.

3. Zhan Sheng - A0215253N - e0535343@u.nus.edu

Personal Contribution to This Project

Uipath code and robot production (Turn the page automatically on the web page and select the time)

Robot debugging,

Project video and scripts production,

Project report (Summary, Objective, Background, Conclusion),

GitHub readme file,

Business Values and Process analysis.

What is the Most Useful Learnt

1) The most useful part is in the planning of the project. The process of weighing whether an activity can use RPA technology instead of manual is very interesting. Although I can't see RPA robots solve all the business process problems, I'd love to see some tedious and boring machine activities replaced by RPA. Being able to use RPA tools such as Uipath and TagUI has increased my interest in RPA. Maybe I can do RPA related work in the future.

2) As far as I am concerned, I think Uipath only visualizes the programming into independent functional modules. However, people who don't have the

ability to program are bound to work with Uipath. In my project practical process, I still need to change and code many expressions in Uipath, such as loop conditions, if conditions, etc. Only in this way can we make the best use of Uipath. I still like TagUI very much, ha ha.

How to Apply the Knowledge and Skills in Other Situations or Workplaces

1) First of all, the simplest examples are happening t when I am still a student. I could use RPA tools to help me finish my studies, such as spam filtering, automatically summarizing email content, automatically downloading files from LumiNUS, etc.

2) I need to do more in intelligent process automation. If I can really gain more in IPA, I will be more competitive because IPA is certainly more efficient than traditional machine learning methods. For example, if I'm going to find a job in the financial industry. In traditional processes, the process that experts decide whether to buy or sell will be replaced by a RPA robot combined with a variety of machine learning algorithms, which is more effective and accurate. And it can operate automatically in real time, even late at night

3) TagUI is really useful, and it is becoming one of the Python codes I use in common. I have tried TagUI's face recognition, emotion analysis and other functions, they are all very interesting.

Because in the next capstone session, I will be involved in a video analysis project. I also need to do face detection. So I hope TagUI can help me. Haha.

4. Yalavarti Dharma Teja - A0215457A - e0535547@u.nus.edu

Personal Contribution to This Project

1. Designed and built the RPA bot that can perform customer support email automation by handling multiple exceptions.
2. Designed and built the MongodB database with user data that can be used for the project.
3. Designed and built the form based web pages UI that are used in this project.
4. Created the api URLs.
5. Integrated zoom scheduling automation with the email automation via UiPath.
6. Assisted in the making of Project Video, Report and User Guide.
7. Assisted in the initial research and design of the project idea.

What learnt is most useful

1. Learnt to use UiPath in developing RPA projects that can help automate mundane and repetitive tasks.
2. Learnt and understood the difference between RPA (through UiPath) and TagUI, how they work and which can be applied where.
3. Learnt and understood the importance and application of automation in real world scenarios.
4. Understood and learnt the importance of creating minimum viable products (mvp) that have only business/market value.

How to Apply the Knowledge and Skills in Other Situations or Workplaces

1. The acquired knowledge and skill in automating the tasks in customer support domain can be extended to other domains as well, like banking and finance, Human Resource or other large scale government projects etc, where there exist multiple repetitive process that can be automated to achieve higher efficiency and returns, all while minimizing the human errors.
2. Another situation where RPA can be applied is by combining an RPA with machine learning and language processing, which is a great way to improve the flow and accuracy of the information and process it more quickly, all while making it easy for the user.