Advanced Technology Attachment Programme (ATAP)

Final Project Report

At

Thales

Reporting Period

May 2023 to Nov 2023

By

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Project Title: RPA Intern

Project ID: AY222193029

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Summary

The intern is to successfully deliver and complete at least 4 projects using RPA Uipath, OCR, and PowerBI.

The intern is working at Thales Group, which is a multinational company that provides technology solutions for various industries, including aerospace, defense, transportation, and security. In Singapore, 28 Changi North Rise, the factory is responsible for the production and repair of Aviation Electronics (Avionics). These includes In-Flight Entertainment Systems, electrical systems, and more.

The intern's goal is to increase the productivity and efficiency of the production and repair units through the help of automation, through RPA Uipath, OCR, and PowerBI. Here are the main tasks that the intern has completed thus far.

1. Automated e-receiving
2. Trained OCR for automated in-voice data scraping
3. Tookover RPA Healthcheck from the previous intern
4. Automated out-of-bound temperature scaping, and uploading out-of-bound temperature to datalake for PowerBI dashboard
5. Automated downloading of various reports from SAP
6. Logistics Dashboard
7. Automated uploading, downloading, and status-checking of cloud Datalake files

Acknowledgement

I would like to thank my colleagues Guillaume, Urmila, Wang Fan, and Aengus for their constant support.

I would like to specially thank my supervisor Pessy and Alvin, for their guidance during my time at Thales. Despite their busy schedules, they took time to explain to me the production and repair processes in Thales. I would like to thank their patience when guiding me through the challenging projects tasked to me. Through their mentorship, I have grown to be more skilful in RPA, as well as become aware of the workflow of a real-life technology innovation team.

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1. Introduction

1.1. Background and Organisation Structure of Host Organisation

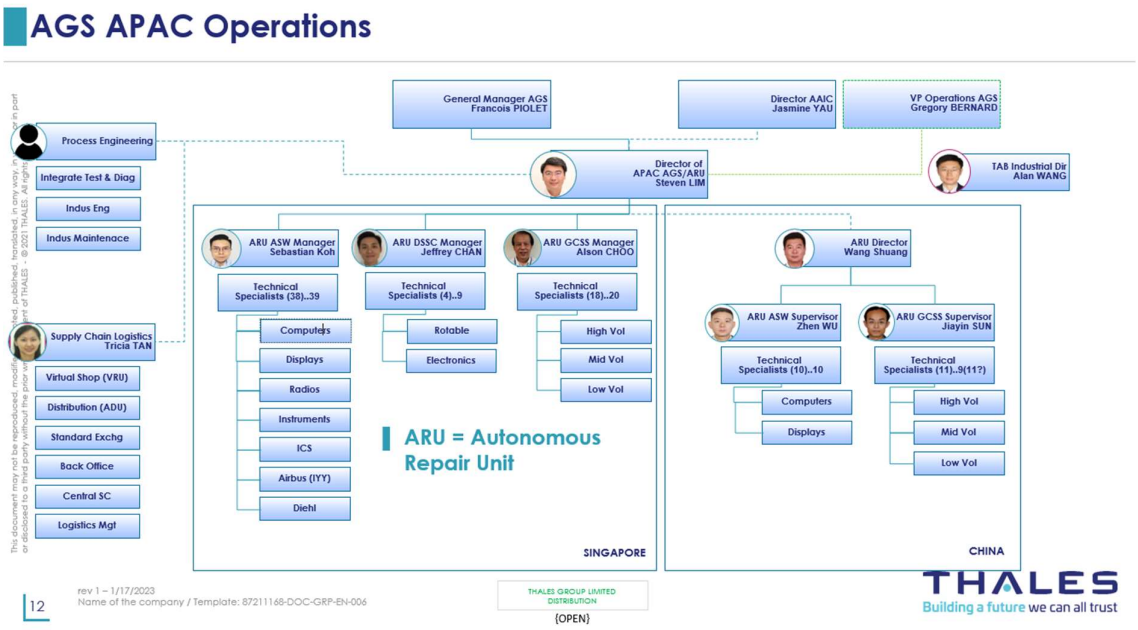
Thales Group is a multinational company that provides technology solutions for various industries, including aerospace, defense, transportation, and security.

The company was founded in France in 1893 and is headquartered in Paris. Thales is known for its work in the areas of electronic systems, avionics, and communications, and is involved in a wide range of projects, including the development of military equipment, air traffic management systems, and secure communications systems.

Additionally, Thales has a presence in many countries worldwide, with operations in more than 50 countries and over 80,000 employees.

Below is the organisation flowchart of Thales in Asia.

The Process and Tools Team, the Host Unit of the Intern, reports directly to Jasmine Yau, the Director of Avionics Asia Pacific Centre (AAIC).



1.2. Training Programme within Thales

Firstly, the intern is tasked with learning UiPath. UiPath is a Robotic Process Automation (RPA) software. Using UiPath Academy, the intern learns topics like data manipulation, exception handling, and interacting with external applications. Additionally, the intern is taught to manage, schedule, and monitor his automation projects efficiently. He works on various real-life projects and use case scenarios to reinforce his learning.

The intern is also tasked with learning Power Bi. Through self-learning, he is able to transform raw data into insightful and interactive visualizations. He creates data models, design visualizations, and build reports based on the factory processes.

Lastly, the intern is tasked with training the Optical Character Recognition (OCR) model. This automates the input of invoices, streamlining the time-consuming and error-prone process of manually extracting data from invoices. The intern is taught how to collect the data with information such as vendor names, invoice numbers, dates, line items, and total amounts. The intern also assesses its performance using a separate evaluation dataset.

2. Training Schedule and Assignments

2.1. Training Schedule by Month for the Entire Training Period

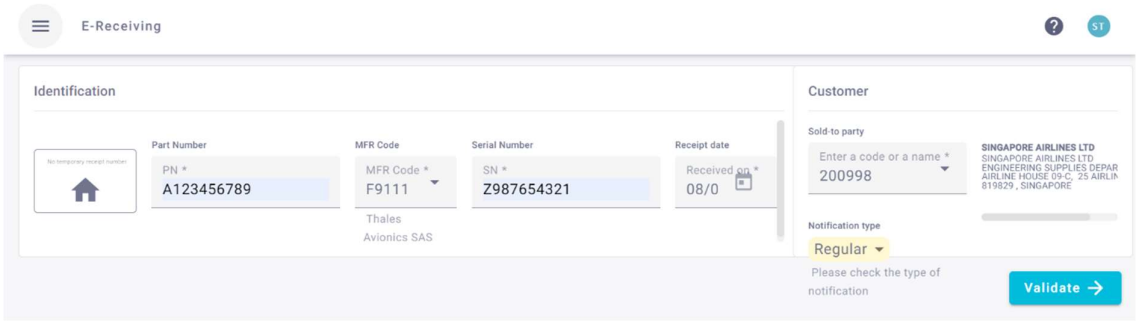
May	• Learnt about the RPA Software UiPath through UiPath Academy
June	• Automated e-receiving
July	• Trained OCR • Automated downloading of FEL Report • Took over healthcheck of RPA Processes • Automated temperature scaping from email, and uploading of temperature to datalake so that PowerBi can be used
August	• Update Intern Guide • Logistics Dashboard
September	• Consolidated all Python files responsible for Datalake files into one mega Python file • Automated downloading of SRU WIP Report
October	• Logistics Dashboard • Simple bar chart to show repair bench utilisation rate

2.2. Training Assignment Completed in May

The intern entered the company on 22th May. During this period, he went into UiPath Academy to learn about UiPath. UiPath Academy offers a variety of courses and hands-on exercises to help users acquire the necessary skills and knowledge to become proficient in building and managing automation solutions using the UiPath platform.

2.3. Training Assignment Completed in June

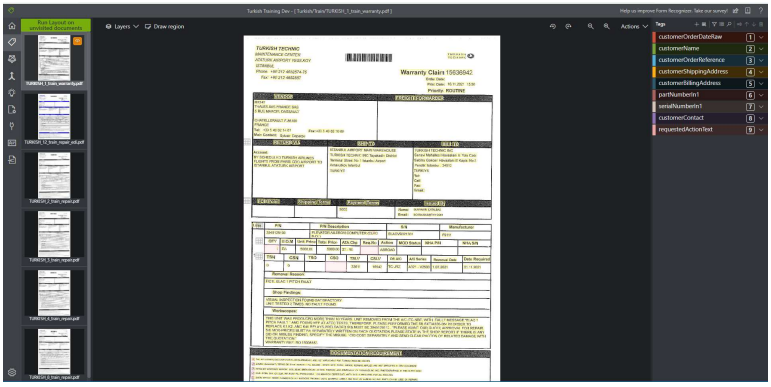
For the first real project, the intern is tasked with automating e-receiving. E-receiving is a process that captures the invoices of Repair Orders sent to Thales, and automatically inputs them into a website. The invoices are scanned automatically using a scanner. Below is a sample of the website, as well as some sample data. (as of writing this interim report, this project is still under progress because the e-receiving website is not fully completed yet)



2.4. Training Assignments Complete in July

2.4.1. OCR

During the month of July, the intern has adjusted in working in Thales. Therefore, he is comfortable in taking on more tasks. For instance, he taught how to train an Optical Character Recognition (OCR) Model. Below is a preview on how the OCR looks.



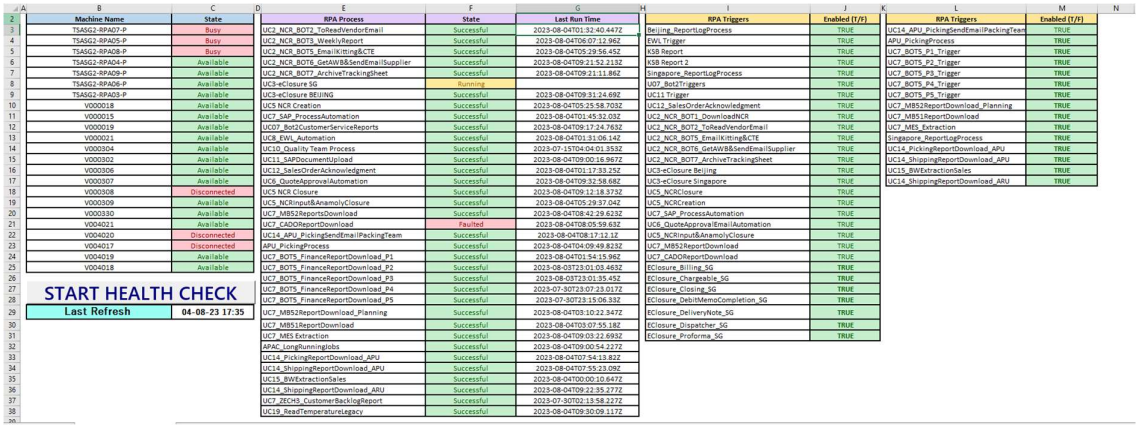
There are various fields such as customerBillingAddress, customerContact, etc. There are a total of 21 fields. Each field is tagged by the intern so that the OCR can locate the field correctly. Each document is then validated on other training documents.

2.4.2. Automate downloading of FEL Report

FEL Report is the consolidation of all the Purchase Orders by Thales. The report is downloaded via SAP periodically every day, so that humans do not have to download the report. The report is downloaded automatically via a RPA robot. This saves about 10 mins each run.

2.4.3. Healthcheck of RPA Processes

The Excel File below is a dashboard that monitors the states of all RPA Processes that is running.



Machine Name	State
TSASG2-RPA07-P	Busy
TSASG2-RPA05-P	Busy
TSASG2-RPA08-P	Busy
TSASG2-RPA04-P	Available
TSASG2-RPA09-P	Available
TSASG2-RPA06-P	Available
TSASG2-RPA03-P	Available
V000018	Available
V000015	Available
V000019	Available
V000021	Available
V000304	Available
V000302	Available
V000306	Available
V000307	Available
V000308	Disconnected
V000309	Available
V000330	Available
V004021	Available
V004020	Disconnected
V004017	Disconnected
V004019	Available
V004018	Available

START HEALTH CHECK

Last Refresh	04-08-23 17:35

RPA Process	State	Last Run Time
UC2_NCR_BOT2_ToReadVendorEmail	Successful	2023-08-04T01:32:40.447Z
UC2_NCR_BOT3_WeeklyReport	Successful	2023-08-04T06:07:12.96Z
UC2_NCR_BOT5_EmailKitting&CTE	Successful	2023-08-04T05:29:56.45Z
UC2_NCR_BOT6_GetAWB&SendEmailSupplier	Successful	2023-08-04T09:21:52.213Z
UC2_NCR_BOT7_ArchiveTrackingSheet	Successful	2023-08-04T09:21:11.86Z
UC3-eClosure SG	Running	
UC3-eClosure BEIJING	Successful	2023-08-04T09:31:24.69Z
UC5 NCR Creation	Successful	2023-08-04T05:25:58.703Z
UC7_SAP_ProcessAutomation	Successful	2023-08-04T01:45:32.03Z
UC07_Bot2CustomerServiceReports	Successful	2023-08-04T09:17:24.763Z
UC8_EWL_Automation	Successful	2023-08-04T01:31:06.14Z
UC10_Quality Team Process	Successful	2023-07-15T04:04:01.353Z
UC11_SAPDocumentUpload	Successful	2023-08-04T09:00:16.967Z
UC12_SalesOrderAcknowledgment	Successful	2023-08-04T01:17:33.25Z
UC6_QuoteApprovalAutomation	Successful	2023-08-04T09:32:58.68Z
UC5 NCR Closure	Successful	2023-08-04T09:12:18.373Z
UC5_NCRInput&AnamolyClosure	Successful	2023-08-04T05:29:37.04Z
UC7_MB52ReportsDownload	Successful	2023-08-04T08:42:29.623Z
UC7_CADOReportDownload	Faulted	2023-08-04T08:05:59.63Z
UC14_APU_PickingSendEmailPackingTeam	Successful	2023-08-04T08:17:12.1Z
APU_PickingProcess	Successful	2023-08-04T04:09:49.823Z
UC7_BOT5_FinanceReportDownload_P1	Successful	2023-08-04T01:54:15.96Z
UC7_BOT5_FinanceReportDownload_P2	Successful	2023-08-03T23:01:03.463Z
UC7_BOT5_FinanceReportDownload_P3	Successful	2023-08-03T23:01:35.45Z
UC7_BOT5_FinanceReportDownload_P4	Successful	2023-07-30T23:07:23.017Z
UC7_BOT5_FinanceReportDownload_P5	Successful	2023-07-30T23:15:06.33Z
UC7_MB52ReportDownload_Planning	Successful	2023-08-04T03:10:22.847Z
UC7_MB51ReportDownload	Successful	2023-08-04T03:07:55.18Z
UC7_MES Extraction	Successful	2023-08-04T09:03:22.693Z
APAC_LongRunningJobs	Successful	2023-08-04T09:00:54.227Z
UC14_PickingReportDownload_APU	Successful	2023-08-04T07:54:13.82Z
UC14_ShippingReportDownload_APU	Successful	2023-08-04T07:55:23.09Z
UC15_BWExtractionSales	Successful	2023-08-04T00:00:10.647Z
UC14_ShippingReportDownload_ARU	Successful	2023-08-04T09:22:35.277Z
UC7_ZEC43_CustomerBacklogReport	Successful	2023-07-30T02:13:58.227Z
UC19_ReadTemperatureLegacy	Successful	2023-08-04T09:30:09.117Z

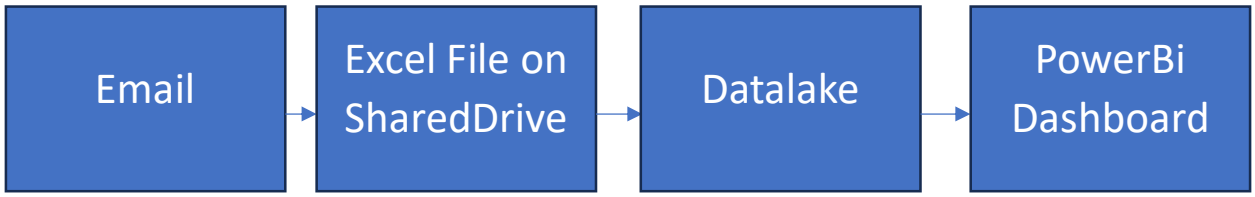
RPA Triggers	Enabled (T/F)
Beijing_ReportLogProcess	TRUE
EWL Trigger	TRUE
KSB Report	TRUE
KSB Report 2	TRUE
Singapore_ReportLogProcess	TRUE
UO7_Bot2Triggers	TRUE
UC11 Trigger	TRUE
UC12_SalesOrderAcknowledgment	TRUE
UC2_NCR_BOT1_DownloadNCR	TRUE
UC2_NCR_BOT2_ToReadVendorEmail	TRUE
UC2_NCR_BOT5_EmailKitting&CTE	TRUE
UC2_NCR_BOT6_GetAWB&SendEmailSupplier	TRUE
UC2_NCR_BOT7_ArchiveTrackingSheet	TRUE
UC3-eClosure Beijing	TRUE
UC3-eClosure Singapore	TRUE
UC5_NCRClosure	TRUE
UC5_NCRCreation	TRUE
UC7_SAP_ProcessAutomation	TRUE
UC6_QuoteApprovalEmailAutomation	TRUE
UC5_NCRInput&AnamolyClosure	TRUE
UC7_MB52ReportDownload	TRUE
UC7_CADOReportDownload	TRUE
EClosure_Billing_SG	TRUE
EClosure_Chargeable_SG	TRUE
EClosure_Closing_SG	TRUE
EClosure_DebitMemoCompletion_SG	TRUE
EClosure_DeliveryNote_SG	TRUE
EClosure_Dispatcher_SG	TRUE
EClosure_Proforma_SG	TRUE

RPA Triggers	Enabled (T/F)
UC14_APU_PickingSendEmailPackingTeam	TRUE
APU_PickingProcess	TRUE
UC7_BOT5_P1_Trigger	TRUE
UC7_BOT5_P2_Trigger	TRUE
UC7_BOT5_P3_Trigger	TRUE
UC7_BOT5_P4_Trigger	TRUE
UC7_BOT5_P5_Trigger	TRUE
UC7_MB52ReportDownload_Planning	TRUE
UC7_MB51ReportDownload	TRUE
UC7_MES_Extraction	TRUE
Singapore_ReportLogProcess	TRUE
UC14_PickingReportDownload_APU	TRUE
UC14_ShippingReportDownload_APU	TRUE
UC15_BWExtractionSales	TRUE
UC14_ShippingReportDownload_ARU	TRUE

The dashboard is refreshed every minute. Based on which process fails, the intern will rerun the process according to the Intern's Guide. The intern self-taught how to maintain the dashboard, as well as add new processes.

2.4.4. Automatic Temperature and Humidity Data Scraping

Everyday, temperature and humidity sensors from the factory sends data via email to stackholders. The intern's job is to scape the data from the emails through RPA, and then compile these data into an Excel file. This Excel file is then uploaded onto datalake, so that a PowerBI dashboard can link up to the data on datalake, so that information can be displayed. Below is the dataflow for the Automatic Temperature and Humidity Data Scraping.



2.5. Training assignments completed in August

2.5.1. Update Intern Guide/Documentation

The intern is tasked with updating the intern guide. He documents all the processes that he had made, and also explains how to debug them. The helps the next intern, as well as any reader, to have the necessary knowledge to understand the various processes, and how to troubleshoot them.

2.5.2. Logistics Dashboard

The logistics dashboard aims to inform the production team whether or not what they produced is on schedule with what is being planned. The logistics dashboard tracks the cumulative discrepancy from the previous days, to show whether or not the shortfall or oversupply of electronic parts have recovered. The logistics dashboard also tracks whether or not the picked (i.e. produced) items and the shipped items are equal to one another. The logistics dashboard is updated live, so that the production

team can be informed live whether there is an oversupply or undersupply, so that they may adjust the rate of production accordingly. Below is a screenshot of the logistics dashboard.

	Date	Monday, October 23, 2023				
LRU	Material Number	Plan12PM	Picking	ToAgs	Discrepancy	Shipping
SEC C	B372CAM0100:F9111	5	5	0	0	
IWDU NST	C19734EA01:F9111	1	2	0	1	
IWDU NS	C19734DA01:F9111	0	1	0	1	
IWDU	C19734AA01:F9111	0		0	0	
FMGEC LA PEG	C13226LA02:F9111	0		0	0	
FMGEC HB15 TAV	C13176HB15:F9111	0		0	0	
FMGEC HA10 TAV	C13176HA10:F9111	0		0	0	
FMGEC HA07 TAV	C13164HA07:F9111	0		0	0	
FMGEC HA PEG	C13226HA15:F9111	0		0	0	
FAC C	C13206AA00:F9111	5	5	0	0	
EDU	C19755BA01:F9111	12	6	6	0	
CPIOM-K	C13221AA01:F9111	0		0	0	
CPIOM-J	C13210DA01:F9111	0		0	0	
CPIOM-H	C13209DA01:F9111	0		0	0	
3G DB TAV	C13208DB00:F9111	0		0	0	
3G DA PEG	C13207DA00:F9111	7	7	0	0	
3G CB TAV	C13208CB00:F9111	0		0	0	
3G CA PEG	C13207CA00:F9111	2	2	0	0	

2.6. Training assignments complete in September

2.6.1. Consolidated all Python files into one mega Python file

In the past, the many Python files are ran by a Task Scheduler. This makes it difficult to monitor which Python file has failed. The intern consolidated all the Python files into one mega Python file, so that the user don't have to check each Python file one by one to find out where is the problem. Furthermore, the Python files have been integrated into Healthcheck, so that the user might know whether or not the Python file have been run. Previously, there was no way to check proactively whether or not a Python file have failed. The team sometimes have to wait for the users to complain to realise that the Python file have failed. Now, the team is able to restart the Python processes before the user complains, so that the team can have better response time to the failure of the Python processes.

2.6.2. Automated download of SRU WIP file

SRU WIP file is short for Small Repair Unit, Work in Progress. It is an excel file, downloaded from SAP, that documents all the small electronics that are currently in repair. Similar to the FEL Report, the report is downloaded via SAP periodically every day, so that humans do not have to download the report. The report is downloaded automatically via a RPA robot. This saves about 10 mins each run.

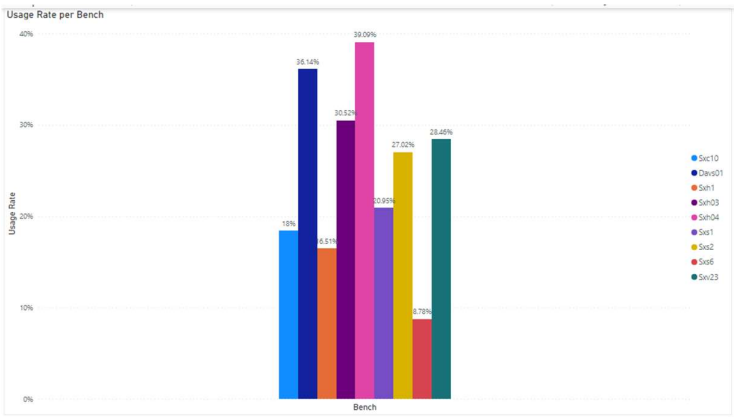
2.7. Training assignments completed in October

2.7.1. Logistics Dashboard

As written beforehand

2.7.2. Bench Utilisation rate barchart

A report has to be made to show what is the rate of utilisation of each repair bench. This is to show to French VIP how much the bench has been utilised. Below is the screenshot of the created barchart.


Usage Rate per Bench
40%
30%
20%
10%
0%
Usage Rate
18%
36.14%
16.51%
30.52%
39.09%
20.95%
27.02%
8.78%
28.46%
Bench
Sxc10
Davs01
Sxh1
Sxh03
Sxh04
Sxs1
Sxs2
Sxs6
Sxv23

3. Knowledge and Experience Gained

3.1. Technical Knowledge Gained from Assignments

During my internship, I had the opportunity to learn about Robotic Process Automation (RPA) and specifically, the RPA Software UiPath, through UiPath Academy. This equipped me with the knowledge and skills required to use UiPath for automation projects. I learned about the basics of RPA, the functionality of UiPath Studio, and how to manage automation processes using UiPath Orchestrator.

Through e-receiving, I designed and developed an automation workflow that streamlined the process of receiving electronic invoices.

Another valuable learning experience was training the Optical Character Recognition (OCR) for data extraction. I acquired the skills to teach an OCR engine to read and interpret data from various documents, such as invoices. This allows robots to process unstructured data effectively.

I also gained valuable experience when maintaining the health check of existing RPA processes. It taught me to automate my checking workflows so that I can focus more time on development, and less time on monitoring my RPA Processes.

By automating temperature scraping from emails and uploading the data to a datalake for visualization in Power BI, I learnt to create a seamless pipeline for collecting and analyzing data, which provided real-time insights for decision-making and alerts.

I have learnt to write clear, concise, and well-organized documentation of the work that I have done.

Last but not least, through consolidating the Python Files for Datalake, I have learnt to review code, and identify redundant code, so as to streamline the data management processes. I have made the code modular, so that it is easy for the next person to reuse and maintain the code. I have learnt how to monitor whether these processes are running successfully or not.

3.2. Organisational/Industry Experience Gained from Assignments

Throughout my internship, I had the opportunity to not only develop technical skills in RPA and UiPath but also enhance various soft skills that are vital in any professional setting.

One of the significant soft skills I acquired during my internship was adaptability. Learning about the RPA Software UiPath through the UiPath Academy required me to adapt to new learning environments and techniques. As I had been used to writing lines of code, coding in a low-code environment was a new challenge to me. I had to balance what I had learnt in university and apply these concepts onto a low-code environment.

Effective communication was also a crucial skill I honed during my internship. As I took over the PowerBi dashboard from the previous intern, I had to communicate with the previous intern, and understand their requirements and stakeholders. I also had to go down to the factory to ask questions, actively listen, and provide clear and concise updates on the PowerBi dashboard.

Time management was another essential skill I developed during my internship. Working on multiple projects simultaneously, such as e-receiving, OCR training, FEL Reports automation, and health checks, required me to prioritize tasks, set achievable deadlines, and stay organized. Learning how to manage my time efficiently ensured that I could deliver high-quality work within the given timeframe and meet project milestones set by my supervisors.

3.3. Areas of Applicability of Knowledge and Experience Gained

I believe that RPA and PowerBi will continue to increase in popularity for several reasons. Namely, more companies would like to reduce their costs, increase their productivity, and embrace digital transformation for Industry 4.0. As such, RPA and PowerBi will be adopted by many companies to achieve such aims. My experience in learning RPA and PowerBi can be transferred to these organisations should they want to automate their processes through RPA.

4. Conclusions

4.1. Summary of Work Completed and Training Received

During the internship, I gained technical knowledge in Robotic Process Automation (RPA) and UiPath through UiPath Academy. I learned the basics of RPA, UiPath Studio, and how to manage automation processes using UiPath Orchestrator. I automated e-receiving, trained Optical Character Recognition (OCR) for data extraction, automated the downloading of FEL Reports, and maintained the health checks of existing RPA processes. Additionally, I automated temperature scraping from emails and uploading data to a datalake for visualization in Power BI. I have documented the tasks that I have accomplished. I improved a Logistics Dashboard to improve Thales' ability to monitor and manage logistics operations, enabling better decision-making and enhancing overall efficiency. I have consolidated multiple Python files into a single Python script, reducing redundancies, and improving the debugging process when there is a problem. Lastly, I was able to show the efficiency of the repair benches in Thales.

4.2. Problems Faced

I faced a challenge in the initial stages of the internship when learning about RPA and the UiPath platform through UiPath Academy. Adapting to a low-code environment and understanding how to apply my university knowledge to this new platform required flexibility and a willingness to learn.

Additionally, working on multiple projects simultaneously, such as e-receiving, OCR training, FEL Reports automation, and health checking, presented a challenge in managing time effectively.

When some of the RPA Processes failed, I had to use problem solving skills to debug the programs that I did not write.

I also had to edit some old code that I did not write, so that I can upgrade these processes. This taught me how to read code written by other people.

When working on the Logistics Dashboard, I have to carefully listen to what the stakeholders want, so as to reduce the amount of changes I make to the dashboard.

4.3. Assessment of Training Experience and Concluding Remarks

As my internship with Thales approaches its end, I want to take this moment to thank my supervisors for the training that I had received under their guidance. I'm thankful to be given the opportunity to learn and grow in the field of RPA. Taking on the various projects helped me realise how automation could streamline operations and reduce manual efforts significantly. Using PowerBi also taught me how to provide real-time insights for stakeholders at Thales to make better decisions, and increase their productivity.

I’m confident that the team in Process & Tools is one of the best teams to be attached to learn about RPA. I’m certain that with Pessy and Alvin’s strong leadership, the Process & Tools Team will continue to flourish in their automation projects.