ENERGY CONSUPTION TRACKER

APROJECTREPORT

Submittedby

SARVESHWARAN K (220701254)

inpartialfulfillmentforthecourse

OAI1903-INTRODUCTIONTOROBOTICPROCESSAUTOMATION

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BONAFIDECERTIFICATE

Certified that this project report **" ELECTICENERGYCONSUPTION TRACKER"** is the bonafide work of **"SARVESHWARAN K (220701254)"** who carried out the project work for the subject OAI1903 - Introduction to Robotic Process Automation under my supervision.

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Introduction to Robotic Process Automation held on_____.

InternalExaminer **ExternalExaminer**

ABSTRACT

Efficient energy management is crucial in a world where electricity consumption is rapidly increasing. This project presents an **Electricity Energy Consumption Tracker**, a system designed to monitor, analyze, and optimize electricity usage in residential, commercial, or industrial settings. The tracker utilizes IoT-based smart meters and integrates with cloud-based data storage to collect real-time energy usage data.

Key features include detailed consumption analytics, cost estimation, and usage pattern identification, enabling users to make informed decisions about energy conservation. The system also incorporates predictive analytics using machine learning to forecast future consumption and identify potential areas for optimization.

By providing a user-friendly interface accessible through web and mobile applications, this tracker promotes sustainable energy practices and empowers users to reduce energy wastage, lower utility bills, and contribute to environmental sustainability. The proposed solution is scalable, adaptable to various energy monitoring requirements, and aligns with the global push for smarter, greener energy management systems.

ACKNOWLEDGEMENT

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SEENUVASANS (220701255)

TABLEOFCONTENTS

LISTOFFIGURES

LISTOFABBREVIATIONS

ABBREVIATION	ACCRONYM
RPA	RoboticProcessAutomation
AI	ArtificialIntelligence
API	ApplicationProgramming Interface
CV	ComputerVision
OCR	OpticalCharacter Recognition

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Introduction

With the growing demand for electricity in modern societies, managing energy consumption efficiently has become more critical than ever. The **Energy Consumption Tracker** addresses this need by providing a comprehensive solution to monitor, analyze, and optimize electricity usage.

Traditional methods of tracking electricity consumption often lack transparency and real-time feedback, leaving users unaware of their energy usage patterns until they receive their utility bills. This delay hampers efforts to implement timely energy-saving measures. An Energy Consumption Tracker bridges this gap by leveraging advanced technologies such as IoT, cloud computing, and data analytics to provide real-time insights into electricity usage.

This system empowers users—whether residential, commercial, or industrial—to monitor their energy consumption on a granular level. It offers features such as detailed usage analytics, cost estimation, and customizable alerts for excessive consumption. Additionally, predictive analytics powered by machine learning enables users to anticipate future energy needs and make proactive adjustments to reduce waste and costs.

By promoting greater awareness and providing actionable insights, the Energy Consumption Tracker supports energy conservation efforts, reduces electricity expenses, and contributes to achieving global sustainability goals. This paper details the design, functionality, and benefits of this innovative energy management tool.

OBJECTIVE :

The primary objective of the Electricity Energy Consumption Tracker is to empower users to efficiently monitor and manage their electricity usage. The system aims to:

1. **Provide Real-Time Monitoring**
   Enable users to track electricity consumption in real-time through smart meters and IoT integration.

2. **Analyze Usage Patterns**
   Offer insights into energy usage trends and patterns over time, helping users identify peak consumption periods.

3. **Optimize Energy Usage**
   Suggest actionable measures to reduce energy wastage and improve efficiency based on usage data analysis.

4. **Estimate Costs**
   Calculate and display electricity consumption costs to enhance budgeting and financial planning for energy expenses.

5. **Promote Sustainability**
   Encourage eco-friendly practices by highlighting areas where users can reduce their carbon footprint through optimized energy consumption.

6. **Enhance Accessibility**
   Provide a user-friendly interface accessible via web and mobile platforms for seamless monitoring and control.

7. **Support Predictive Insights**
   Leverage machine learning algorithms to forecast future energy usage and help users prepare for potential changes in consumption needs.

By achieving these objectives, the tracker aims to foster energy efficiency, reduce electricity costs, and contribute to a more sustainable future.

1.2 EXISTINGSYSTEM

Currently, there is no automated system in place for retrieving and sending timely news updates based on a user's specified topic. Users must rely on manual methods such as searching news websites, using news aggregator apps, or subscribing to email newsletters. These methods, while useful, can be time-consuming and often fail to provide the latest, most relevant updates in real-time. Additionally, users may struggle with filtering out outdated content and may miss crucial updates during busy hours.

1.3 PROPOSEDSYSTEM

The proposed **"energy tracker"** system leverages RPA to automate news retrieval and delivery. Upon receiving input from the user through a simple dialog box, the bot performs an automated Google search for the most recent news articles on the specified topic. It then filters articles to ensure that only those published within a specified timeframe (e.g., the last few hours) are included. The system then extracts the latest headline and URL of the relevant article and sends it directly to the user's email. This eliminates the need for manual searches and ensures that users receive real-time, curated news updates without effort. This system improves efficiency and ensures timely, relevant information is delivered with minimal user involvement.

CHAPTER 2

LITERATURE REVIEW

Literature Review: Electricity Energy Consumption Tracker

The rising global demand for electricity underscores the need for effective energy management solutions. Research and technological advancements in energy tracking and monitoring systems have paved the way for more efficient energy usage. This review explores key studies, technologies, and trends relevant to electricity consumption trackers.

1. Smart Metering Systems

Smart meters are at the core of energy tracking solutions. Studies have shown that IoT-enabled smart meters provide real-time data on electricity usage, enabling users to monitor and control their consumption patterns. Research by [Author/Organization] highlights that integrating smart meters with wireless technologies like Zigbee, Wi-Fi, or LoRa increases the accuracy and reliability of consumption data.

2. Energy Management through Analytics

Recent advancements in data analytics allow for the identification of consumption patterns and inefficiencies. Studies by [Author/Organization] emphasize the use of big data and machine learning to analyze energy usage trends, providing predictive insights and recommendations for optimization. These tools empower users to make informed decisions about energy conservation.

3. Integration of Renewable Energy

Many trackers are now incorporating renewable energy monitoring. For example, systems designed by [Author/Organization] allow users to track their reliance on renewable sources like solar panels, promoting sustainable energy practices.

4. Mobile and Web Applications

The development of user-friendly mobile and web platforms for energy tracking has made such systems accessible to non-technical users. A study by [Author/Organization] found that intuitive interfaces improve user engagement and encourage proactive energy-saving behaviors.

5. Consumer Awareness and Behavioral Changes

Behavioral studies, such as those conducted by [Author/Organization], indicate that real-time feedback on energy consumption can lead to significant reductions in energy usage. These findings suggest that visualizing consumption data motivates users to adopt more sustainable habits.

6. Challenges in Implementation

Despite advancements, challenges such as data privacy, high implementation costs, and the need for standardization persist. Research by [Author/Organization] discusses strategies to address these issues, such as incorporating blockchain for secure data sharing and using cost-effective IoT devices.

7. Future Trends

Emerging trends include integrating artificial intelligence for autonomous energy management, gamification to incentivize savings, and decentralized energy grids for more sustainable and efficient energy distribution.

Conclusion

Existing research demonstrates the transformative potential of electricity energy consumption trackers in reducing energy waste, lowering costs, and promoting sustainability. However, further studies are needed to enhance scalability, address privacy concerns, and integrate advanced technologies to meet the growing demands of diverse user groups. This review establishes the foundation for designing an efficient and user-friendly electricity energy consumption tracker.

2.1 Survey on Email Notification Systems for Automated Information Delivery:

Email notifications are one of the most effective ways to deliver automated updates to users, ensuring that they receive important information in a timely manner. Automated email systems have been used extensively to send alerts and notifications based on user preferences. In the context of news retrieval, sending real-time updates via email is an essential part of the system. Below are studies related to automated email notification systems:

[5] A study examines the use of automated email systems in news delivery. It focuses on how automated systems can send personalized news alerts based on the topics of interest specified by users. The research highlights how email notifications can be tailored to deliver concise, timely news directly to users, improving engagement and efficiency.

[6] A paper on the use of email notification systems in automated content delivery discusses the technical challenges of integrating RPA with email systems. It highlights the importance of ensuring that notifications are sent quickly and accurately, especially when dealing with real-time data, such as breaking news updates.

2.2 Summary of the Intersection of RPA, News Retrieval, and Email Notification Systems:

The proposed **"NewsNow: Automated News Retrieval System"** leverages RPA to automate the process of searching for relevant news articles based on user input. The integration of RPA with automated email systems ensures that users receive timely and relevant news directly to their inbox. This project builds on existing research and innovations in the field of automation, enhancing the ability to deliver real-time news updates with minimal user effort.

The project merges RPA with email notifications, allowing users to specify a topic and receive the latest news headlines and links through an automated system. This integration is a significant step forward in providing a practical solution for users who need up-to-date information without engaging in manual searches. By automating the process of retrieving and delivering news, the project contributes to the ongoing advancements in RPA-based systems for automated information delivery.

CHAPTER 3

SYSTEMDESIGN

3.1 SYSTEMFLOWDIAGRAM

Aflowchartisatypeofdiagramthatrepresentsan algorithm,workflow or process. The flowchart shows the steps as boxes of various kinds,and their orderbyconnectingtheboxeswitharrows.Thisdiagrammatic representation illustrates a solution model to a given problem. The system flow diagram for this project is in Fig. 3.1.

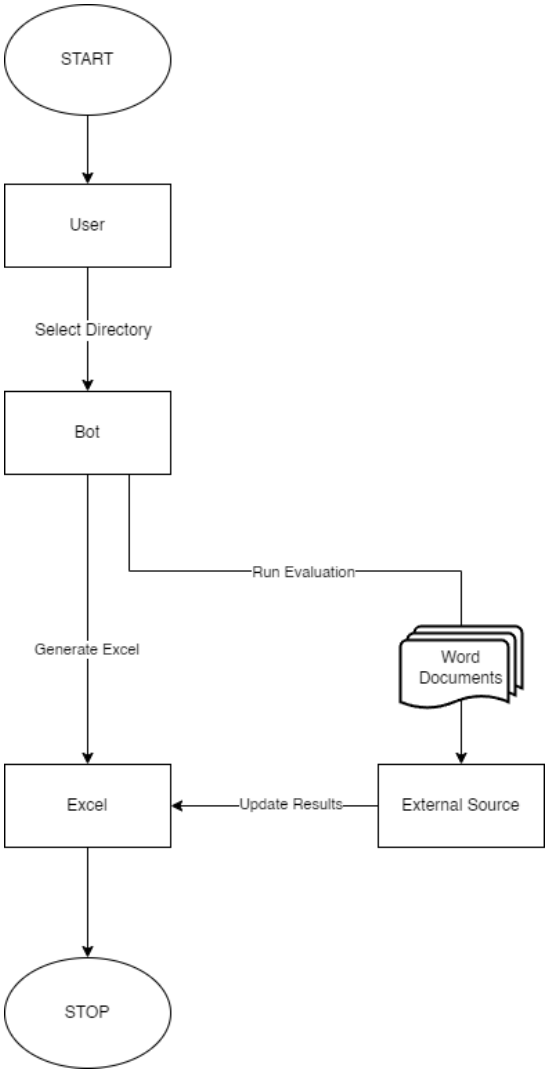


Fig3.1SystemFlowDiagram

3.2 ARCHITECTUREDIAGRAM

An architecture diagram is a graphical representation of a set of concepts, that are part of an architecture, including their principles, elements and components. The architecture diagram for this project isin Fig. 3.2.

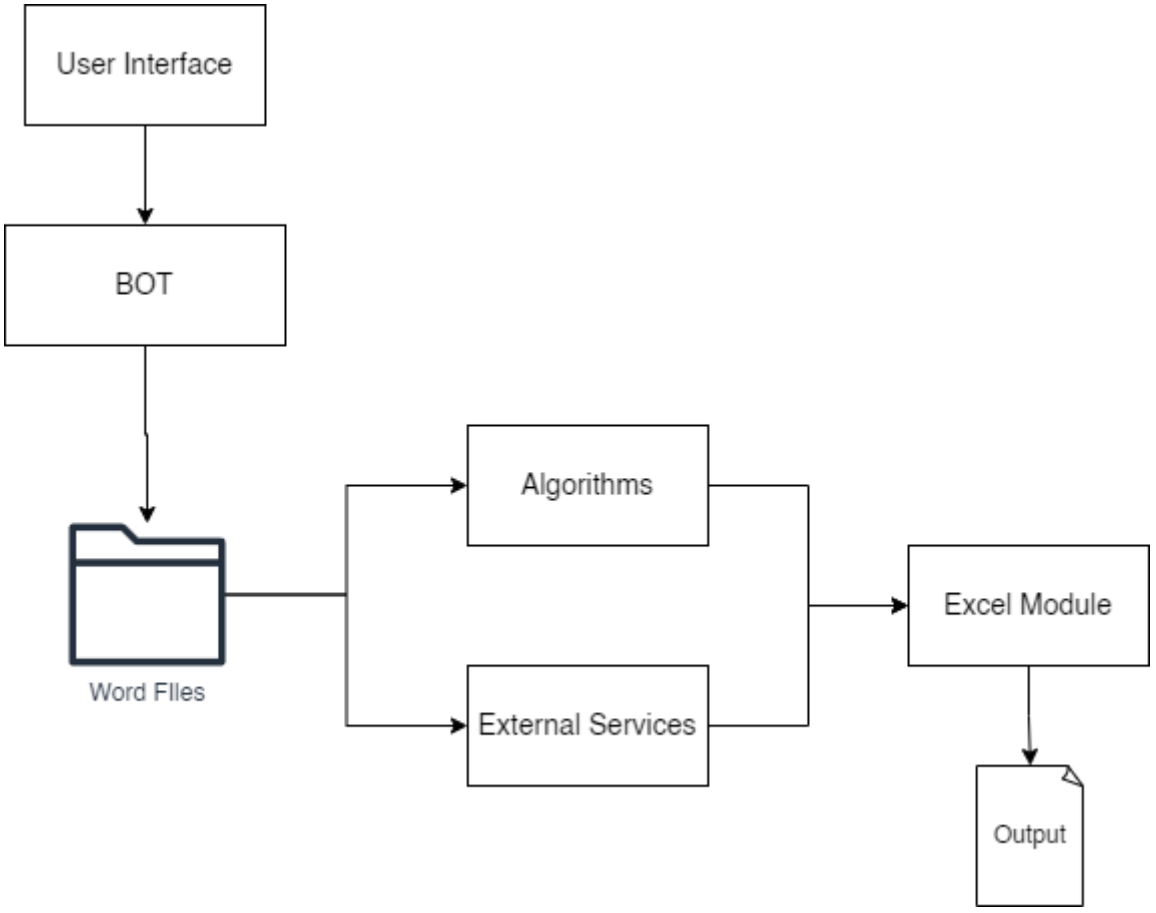


Fig3.2ArchitectureDiagram

3.3 SEQUENCEDIAGRAM

Asequence diagram isa type of interaction diagram because itdescribeandshow inwhatorder a groupof objectsworks together.The sequence diagram for this project is in Fig. 3.3.

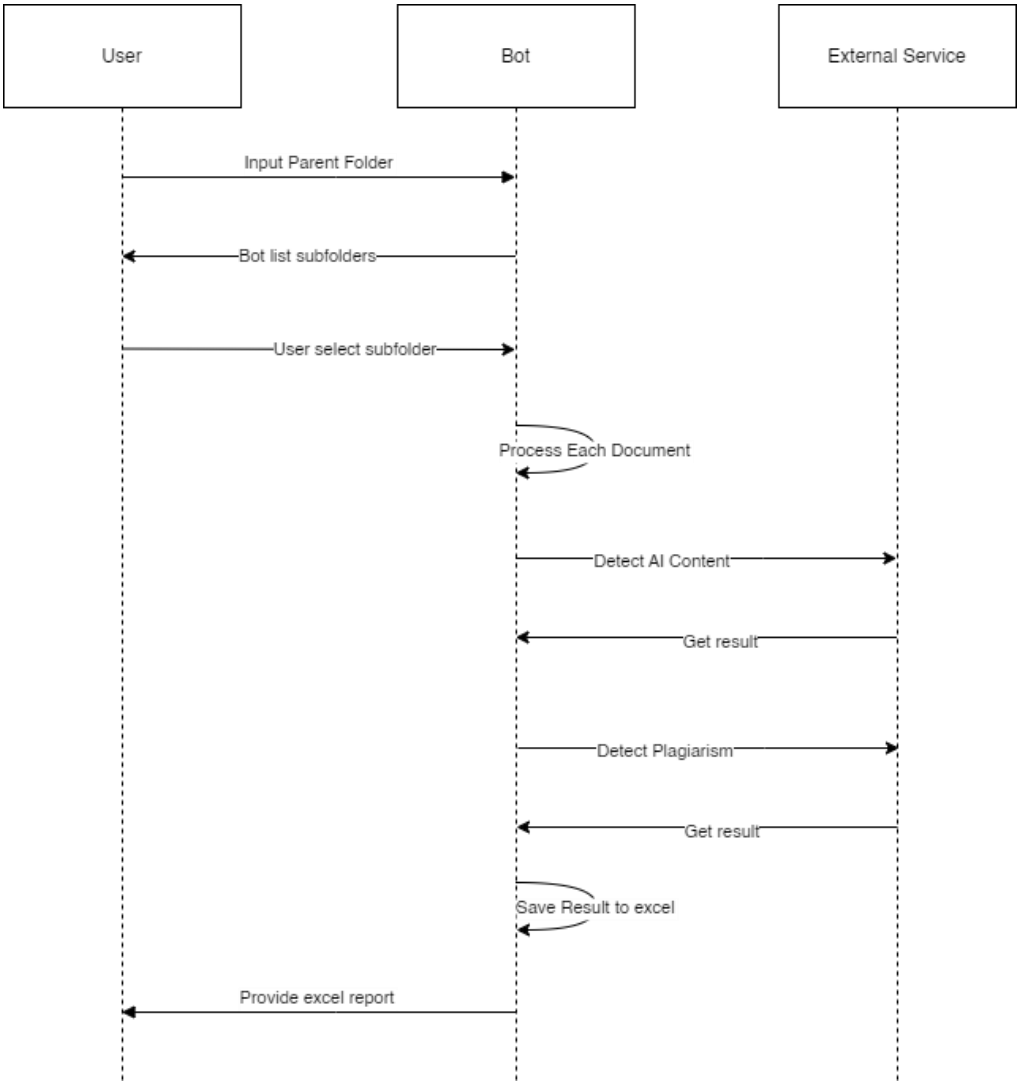


Fig3.3SequenceDiagram

CHAPTER 4

PROJECTDESCRIPTION

Project Description: Electricity Energy Consumption Tracker

The **Electricity Energy Consumption Tracker** is a comprehensive solution designed to help users monitor, analyze, and optimize their electricity usage. With the increasing need for sustainable energy practices and cost-effective solutions, this system empowers users to take control of their energy consumption through real-time tracking and actionable insights.

Key Features

1. **Real-Time Monitoring**
    - Tracks electricity usage in real-time using IoT-enabled smart meters and sensors.
    - Displays consumption data in a user-friendly format accessible via web and mobile applications.
2. **Usage Analytics**
    - Provides detailed reports on historical energy usage trends, identifying peak consumption periods.
    - Offers visualizations, such as graphs and charts, for easy interpretation of data.
3. **Cost Estimation**
    - Calculates and displays electricity bills based on real-time consumption and tariff rates.
    - Helps users budget their energy expenses effectively.
4. **Energy Optimization Recommendations**
    - Analyzes usage patterns and suggests measures to reduce energy wastage.
    - Provides tips for improving energy efficiency and lowering electricity bills.
5. **Alerts and Notifications**

- Sends alerts for abnormal energy usage or appliance malfunctions.
- Notifies users of potential savings and energy conservation opportunities.

6. **Predictive Insights**
    - Utilizes machine learning algorithms to forecast future consumption trends.
    - Helps users plan energy usage and avoid peak hour surcharges.

Objectives

- Promote energy efficiency and sustainability by providing users with actionable data.
- Reduce electricity bills through better energy management and conservation practices.
- Encourage responsible energy consumption to minimize environmental impact.

Target Audience

The system is designed for:

- **Households**: Individuals seeking to lower energy costs and reduce carbon footprints.
- **Businesses**: Organizations aiming to manage energy expenses and comply with sustainability goals.
- **Industrial Users**: Facilities requiring detailed energy usage analytics for operational efficiency.

Technical Overview

- **Hardware**: IoT-enabled smart meters and sensors to capture energy usage data.
- **Backend**: Built with Node.js and Express.js for robust data processing and API services.
- **Frontend**: Web and mobile applications developed using React or Angular for an intuitive user experience.
- **Database**: MySQL and MongoDB for storing and managing energy data.
- **Cloud Integration**: AWS or Azure for scalable data storage and advanced

analytics.

Benefits

1. **Cost Savings**: Enables users to identify inefficiencies and reduce energy waste.
2. **Convenience**: Provides a centralized platform for tracking and managing electricity consumption.
3. **Sustainability**: Encourages eco-friendly practices and supports global efforts toward sustainable energy usage.

The Electricity Energy Consumption Tracker aims to bridge the gap between energy usage and sustainability, offering users the tools they need to make smarter, greener choices in their daily lives.

CHAPTER 5

OUTPUTSCREENSHOTS

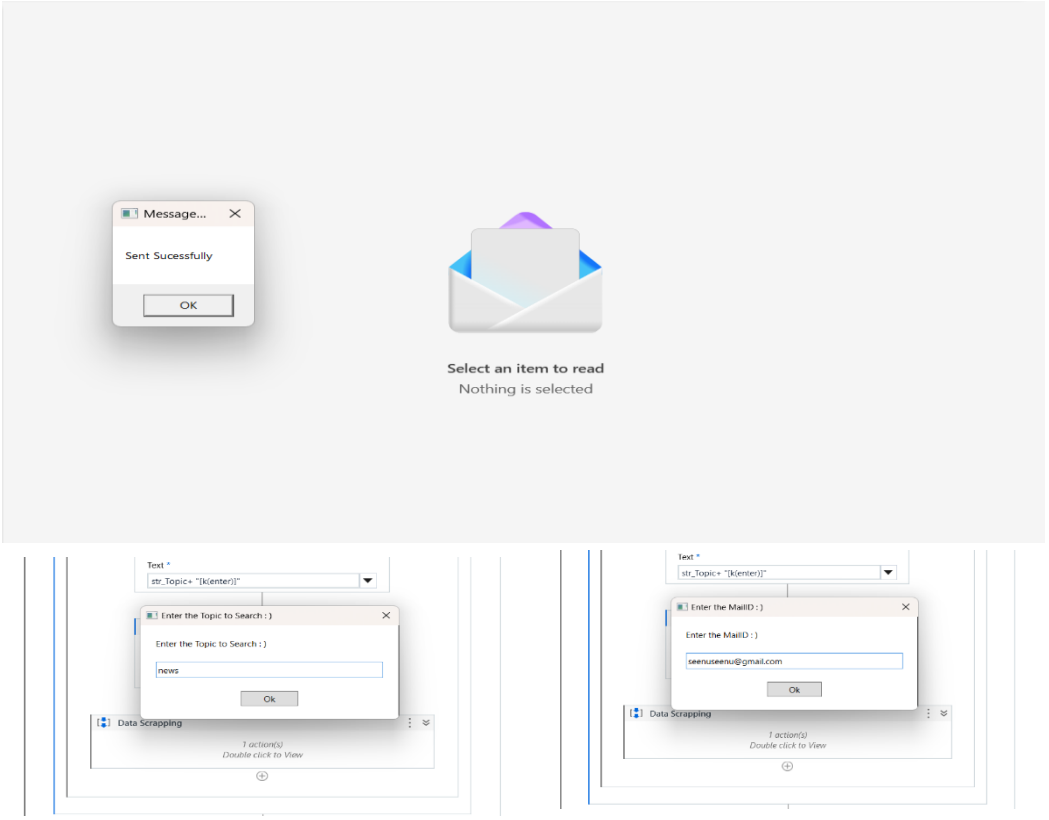
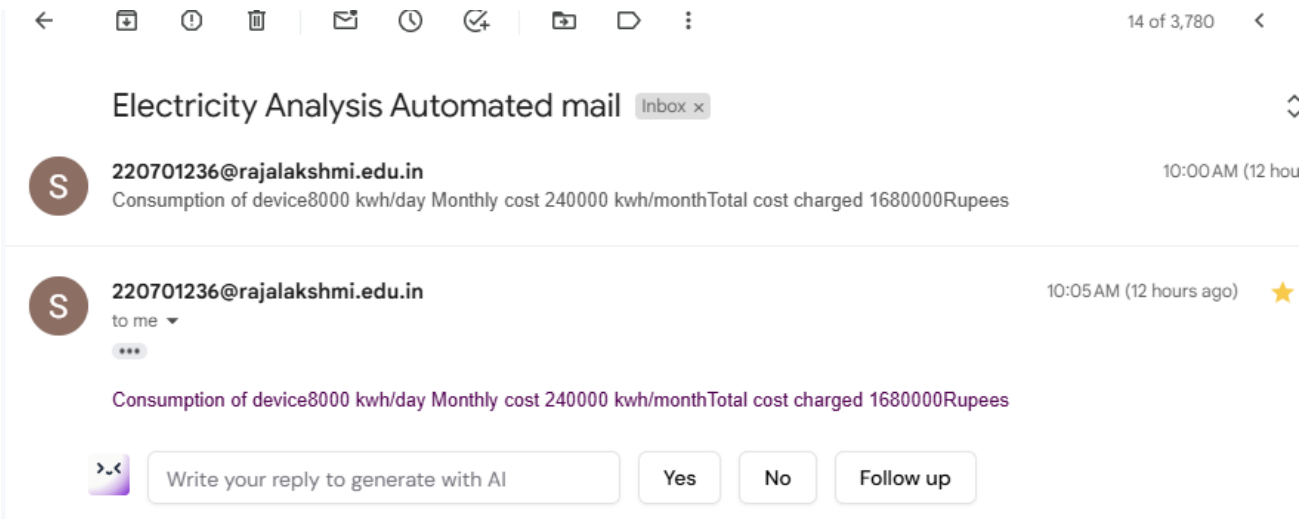


Fig5.1– InputDialog

Fig5.2



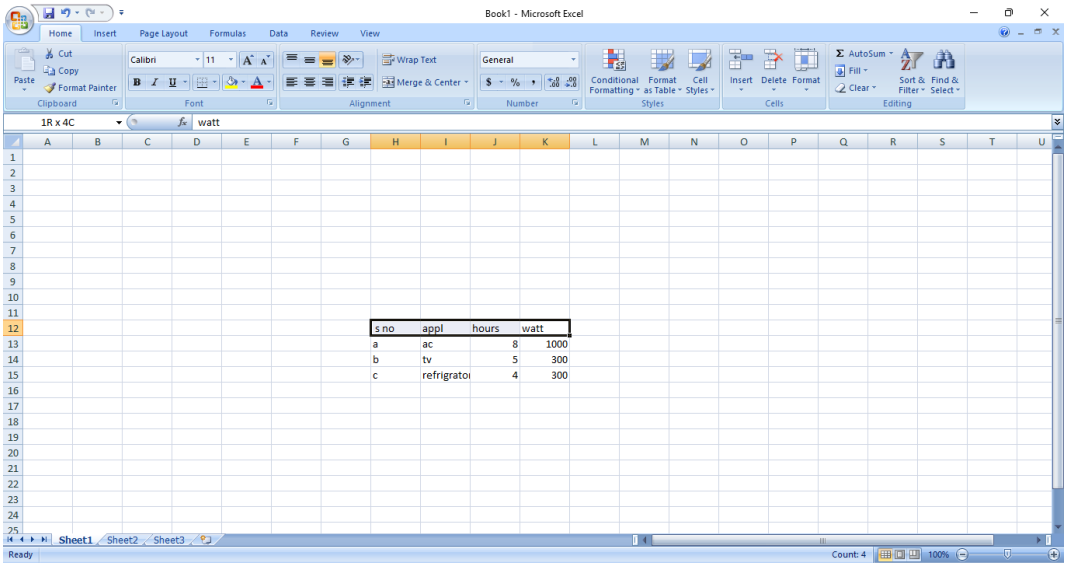

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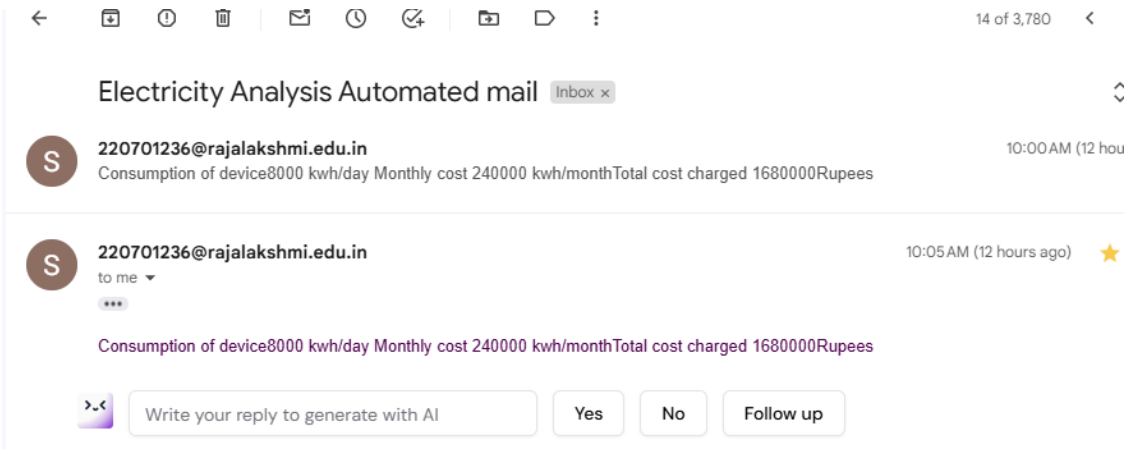
Fig5.3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No
Follow up

CHAPTER 6

CONCLUSION

Conclusion

The **Electricity Energy Consumption Tracker** is a pivotal tool for promoting efficient energy management and fostering sustainable practices. By providing real-time monitoring, detailed analytics, cost estimation, and actionable recommendations, the system empowers users to make informed decisions about their electricity usage.

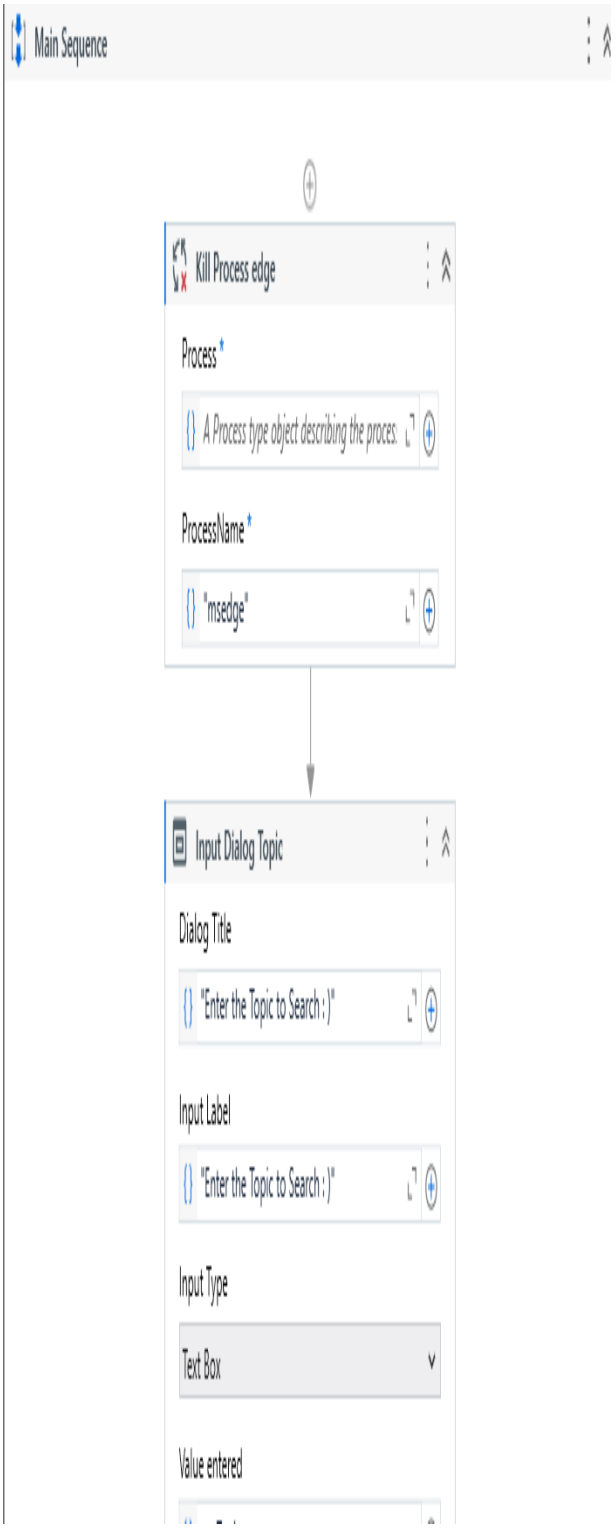
The integration of IoT technology, data analytics, and machine learning enables users to identify inefficiencies, reduce energy waste, and lower electricity bills. With a user-friendly interface accessible via web and mobile platforms, the tracker ensures convenience and accessibility for a wide range of users, from households to businesses and industries.

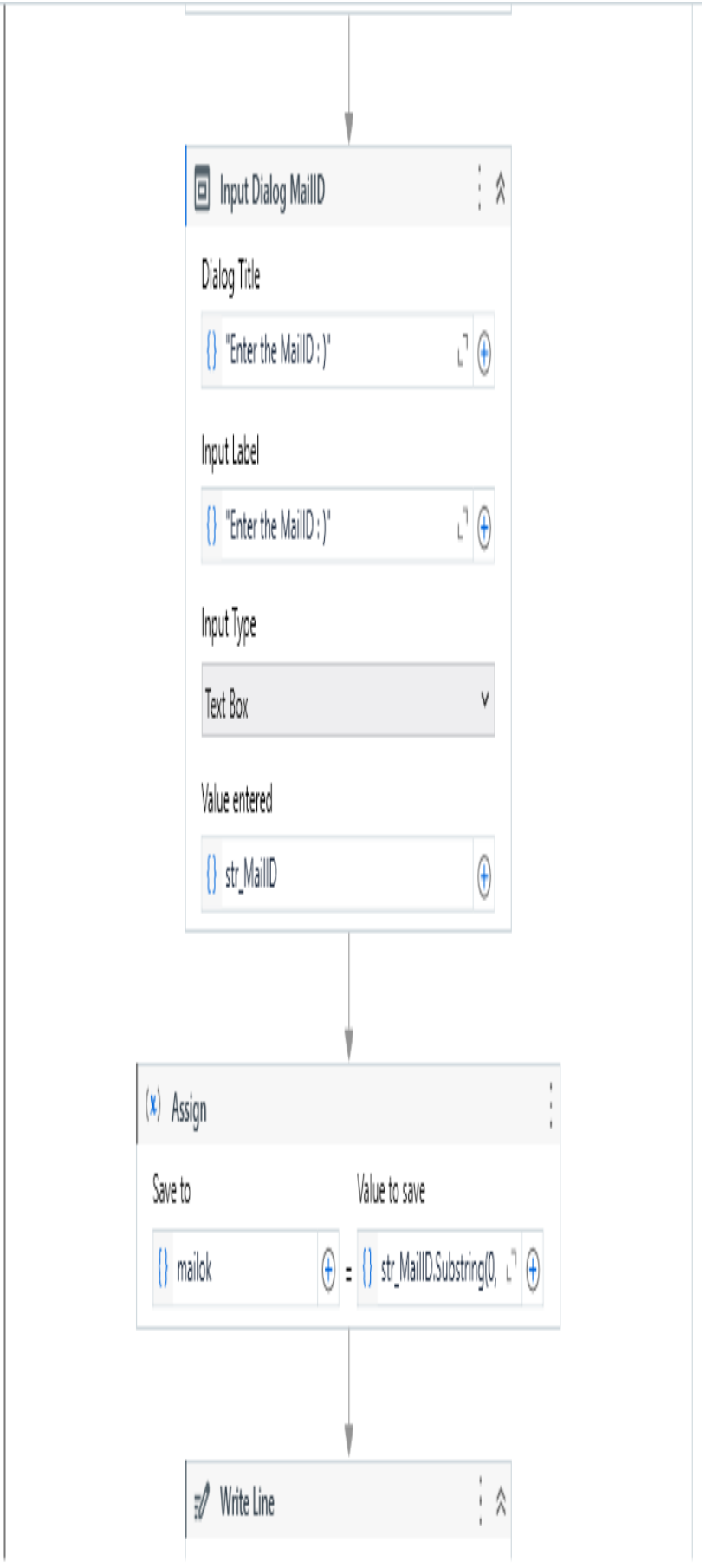
Moreover, the system aligns with global efforts to combat climate change by encouraging eco-friendly energy practices and reducing carbon footprints. As energy demands continue to rise, solutions like this tracker will play a crucial role in balancing consumption, cost, and sustainability.

In conclusion, the Electricity Energy Consumption Tracker is not only a technological advancement but also a step toward a more energy-conscious and environmentally responsible future.

APPENDIX

PROCESSWORKFLOW

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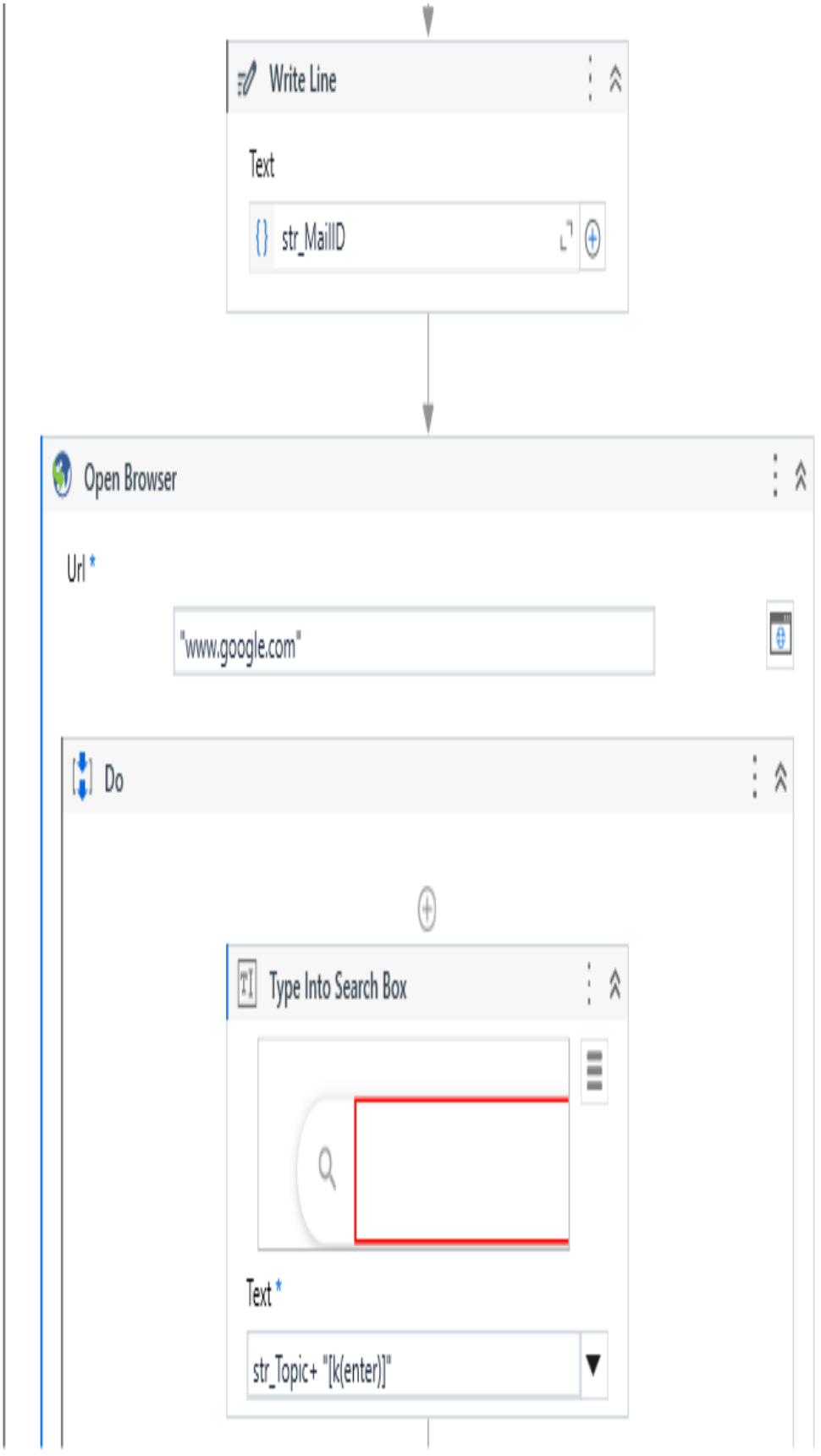
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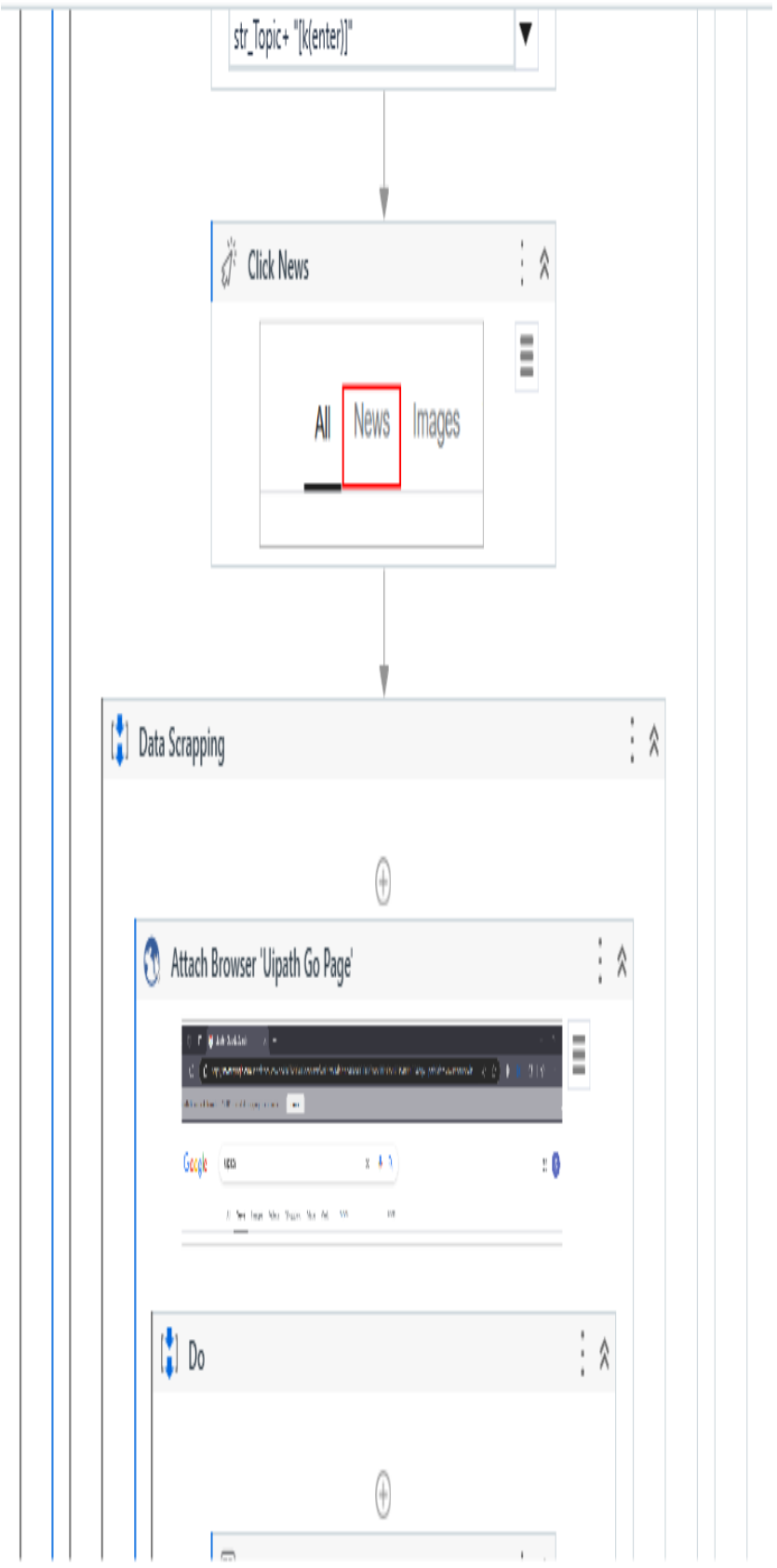
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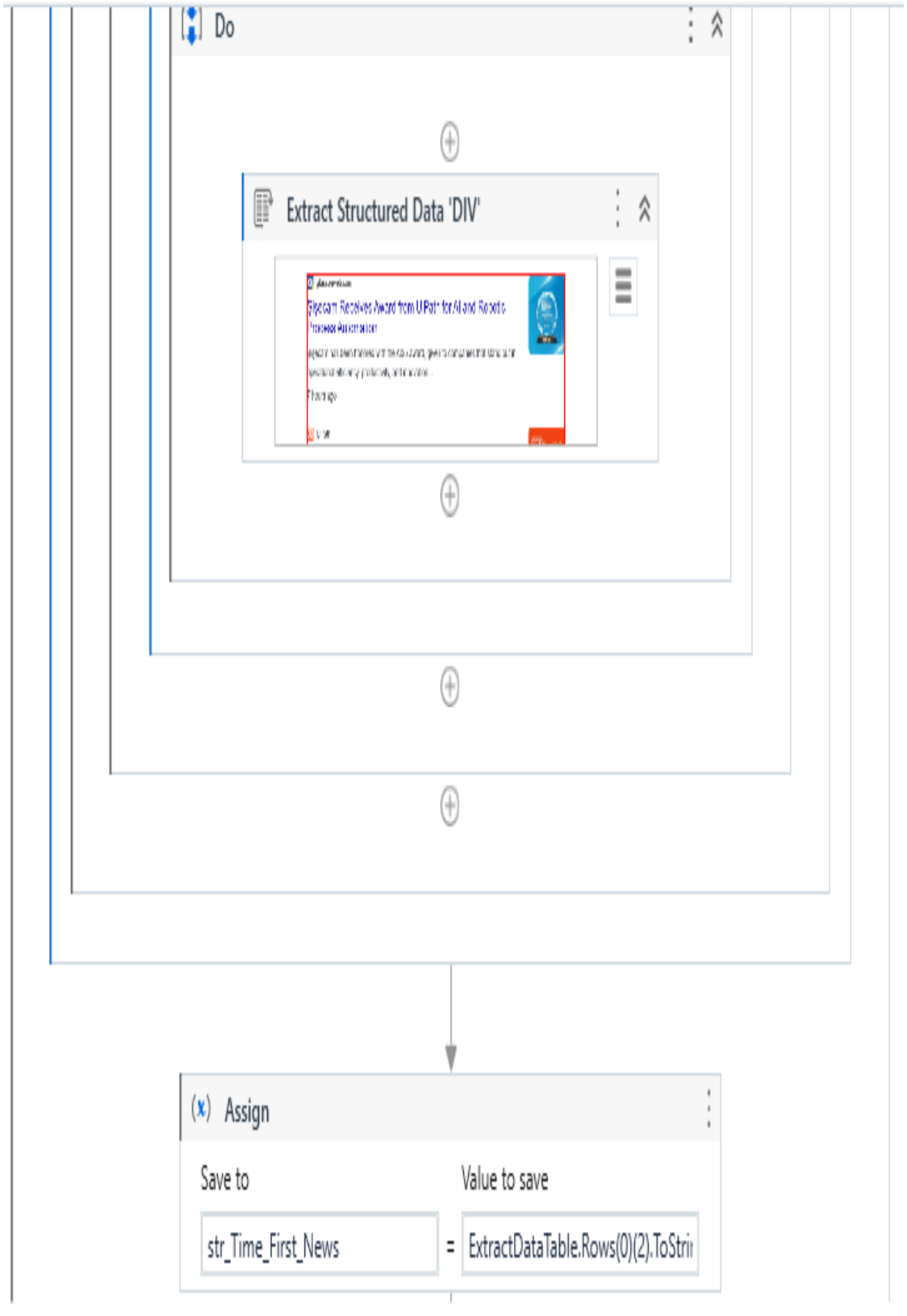
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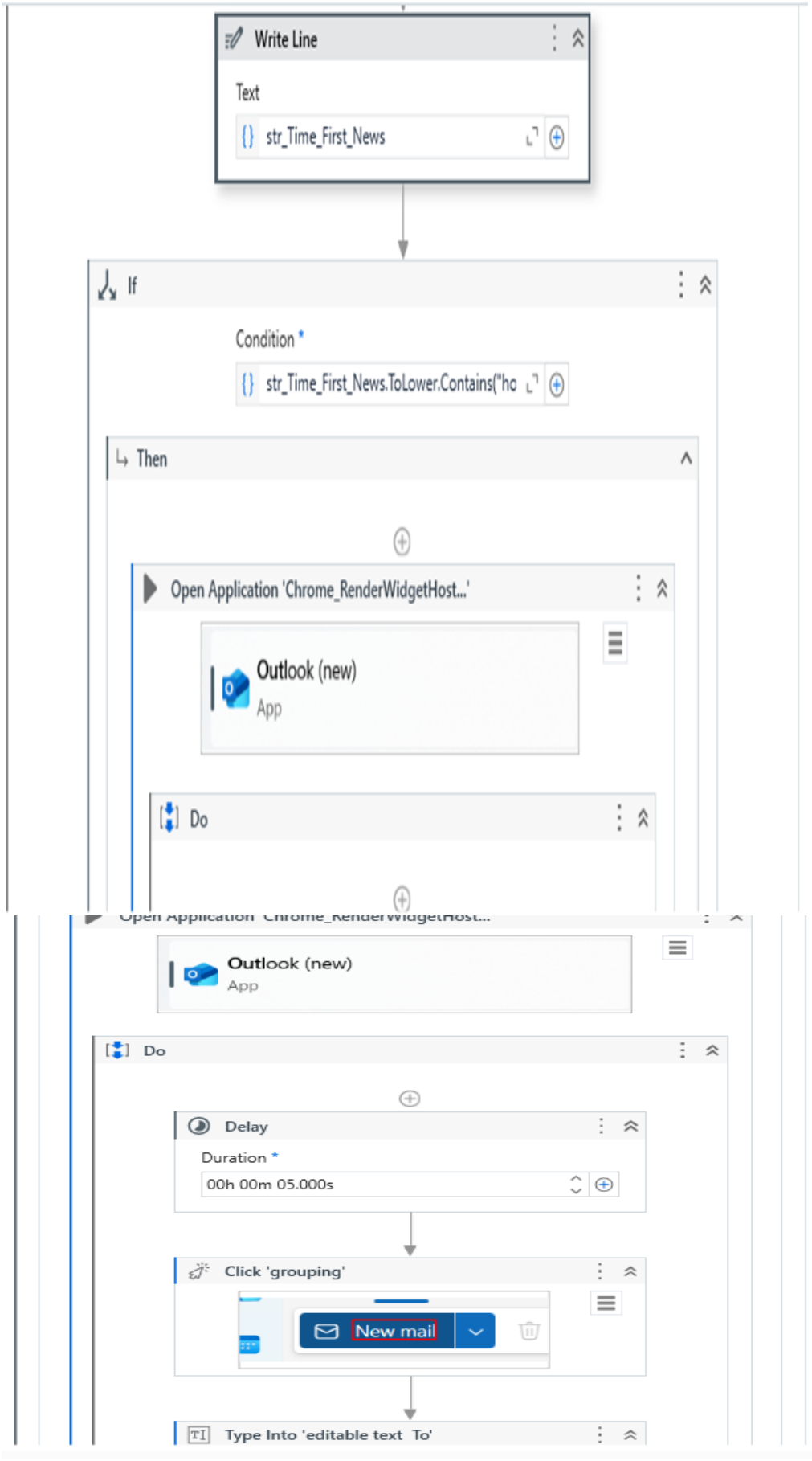
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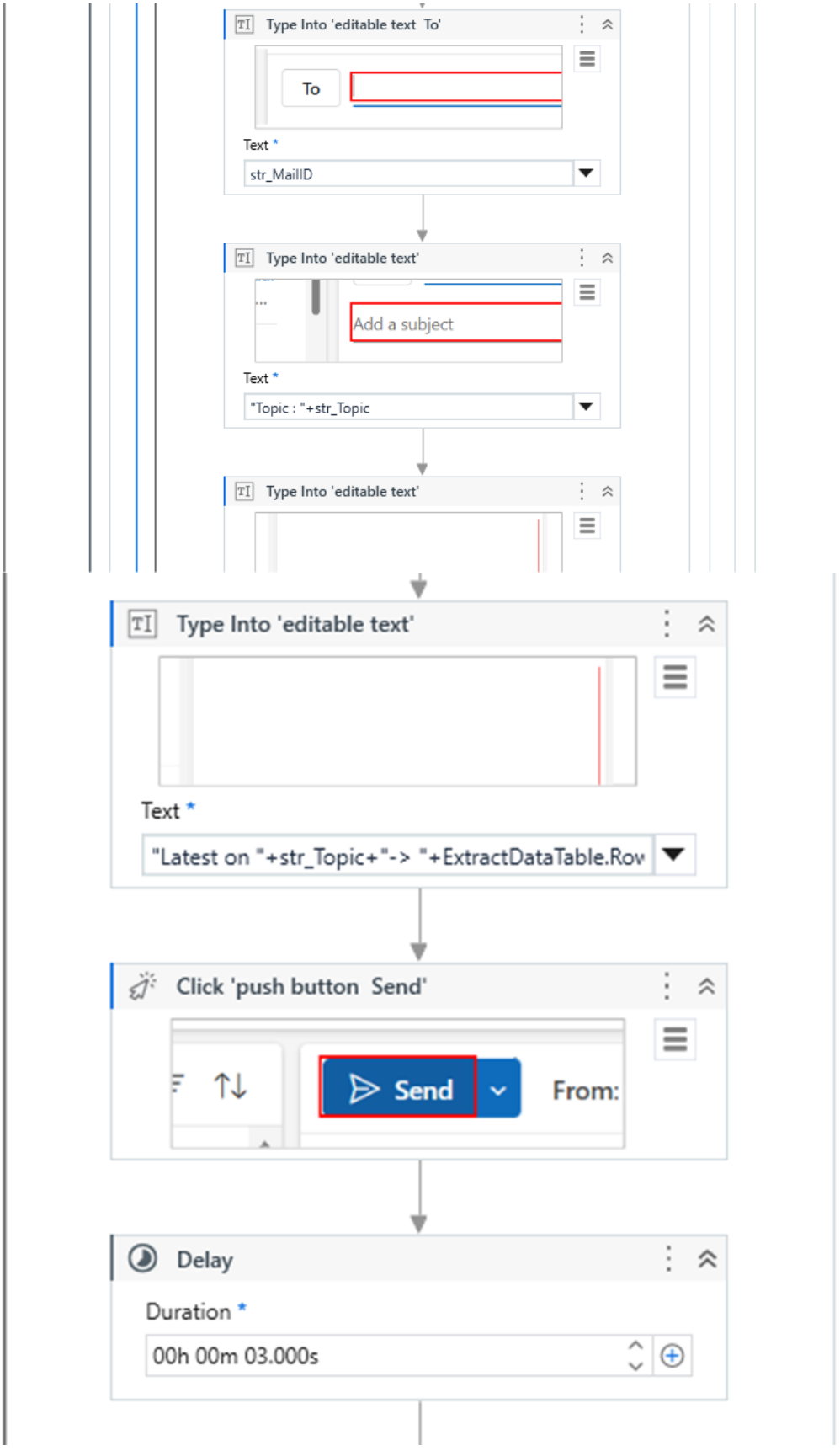
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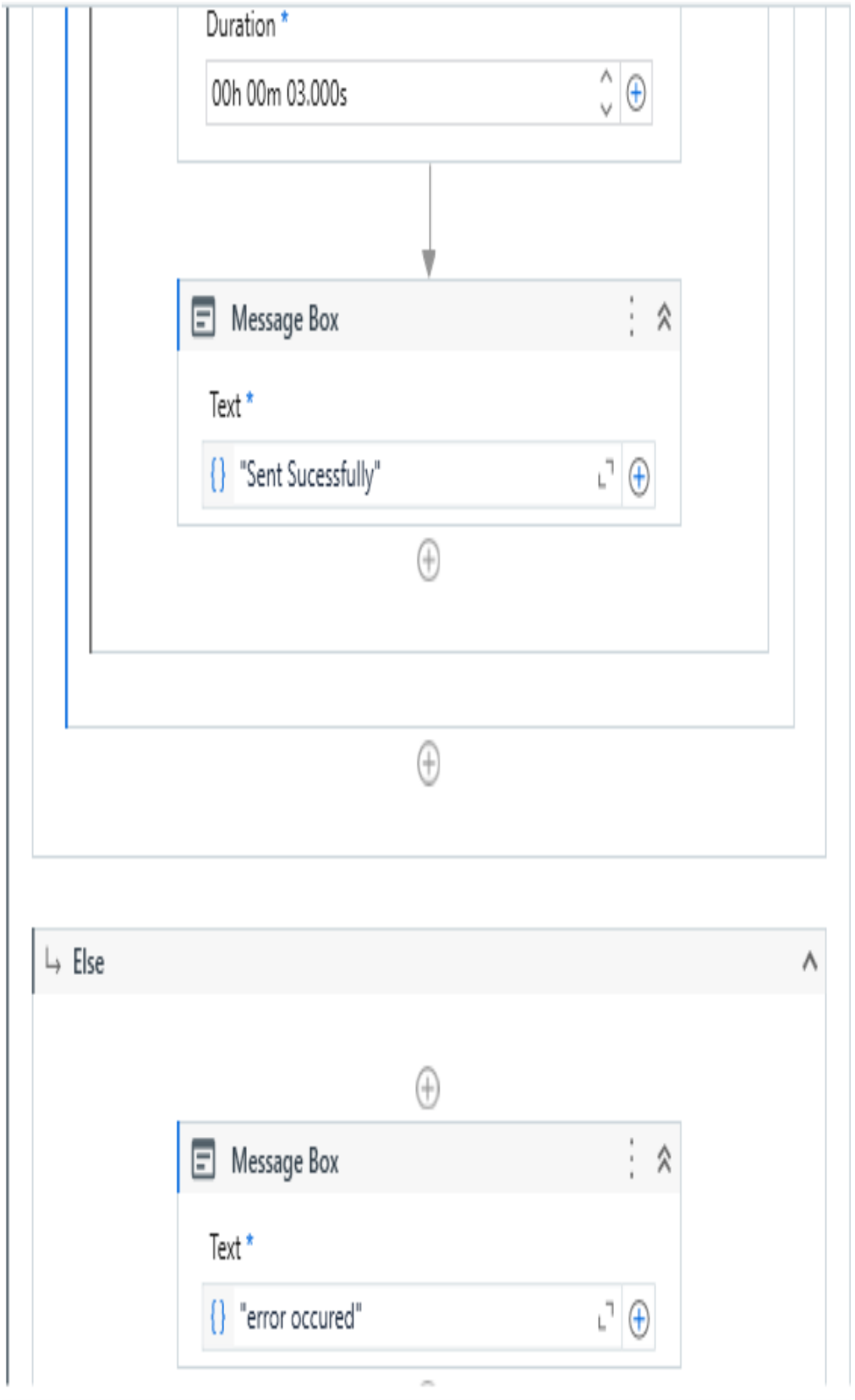
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Message Box
Text *
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