

**SmartLibrarian**

ISS IPA TEAM XX PROJECT REPORT

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1. Problem Statement

What should you read? For both the avid readers and uninitiated, the major retailers, such as Amazon and Kinokuniya, provide a constantly list of best sellers, while blogs and other websites share the must-reads with titles such as “The Top 30 books you must read in your lifetime”. The recommendations are aplenty but how to do readers discern between the different recommendations and how do they get hold of the book for free? This is what SmartLibrarian is here to solve.

* 1. business case

The impact of Covid 19 has turned many businesses online and people toward activities that can be done individually and at home. The online book service market, is not an expectation to this trend, with an annual compounded growth of 6.2% per annum with an expectation to reach 23.8 Billion in 2026.[[1]](#footnote-1)



Figure : Market Concentration[[2]](#footnote-2)

Major industry players in the fragmented ebook market that had a foothold in the ebook market also made moves to consolidate their position. For example, Amazon.com, offered the users a free trial of two months on their “Kindle Unlimited” service since June 2020 in an attempt to on board more users.

Most major players in the ebook market seeks to earn revenue by offering ebooks for sale or via a subscription model that offers a spectrum of books for download. The Smart Librarian seeks to disrupt the market by offering the books for free through the NLB ebooks collection. The recommendation system also provides an additional feature to borrow/read the next book.

The application seek to generate revenue via 2 methods:

**Support from NLB/Government**

As our application supports the goal of “highlighting the resources of NLB and promote a love of reading for pleasure and development”[[3]](#footnote-3), it is highly likely that a collaboration can be achieved between us and NLB. This can in terms of grants or official integration of our application with the NLB website.

**Advertisement/Sponsored Recommendation System**

Currently our Intelligent Book Borrowing System relies on the Amazon recommendation system for our recommendations. However, with the development of the application, our proprietary system for recommendations can be developed and integrated with sponsored recommendations. Advertisements can also be used to generate revenue for the application.

* 1. Our ProposaL

Smart Librarian is an Intelligent Book Borrowing System that can check for the availability of the books with our National Library Board (NLB) so it can be borrowed for free and also recommend books based on your selections.

The goal of the project will be to deliver a Minimum Viable Product (MVP) of our Intelligent Book Borrowing System, SmartLibrarian with the following objectives:

**Activating The Application On The Go**

Integrated with Google Assistant, you can check the availability of a book using your smart phone, no matter where you are. Natural language voice and text support is also a provided to ensure a simple and natural workflow.

**Checking The Availability And Recommendation Of Books**

Boosting a huge selection of books and a great association recommendation system, our application taps on the Amazon system using a Robotic Proces Automation (RPA) to recommend books for the users. An RPA is also used to check the NLB website for the availability of books. As NLB and Amazon both uses their own proprietary search engine, a matching system is also developed to ensure that the results from both NLB and Amazon are the same.

**Notifying The Users On Availability And Recommendations**

An email will be sent to the user to inform the user on the availability of the books selected and the associated recommendations. Summarised abstracts of the book and the links to borrow the books in NLB will be included in the email to tease the content of the book and to ensure a seamless borrowing process respectively.

1. System Overview

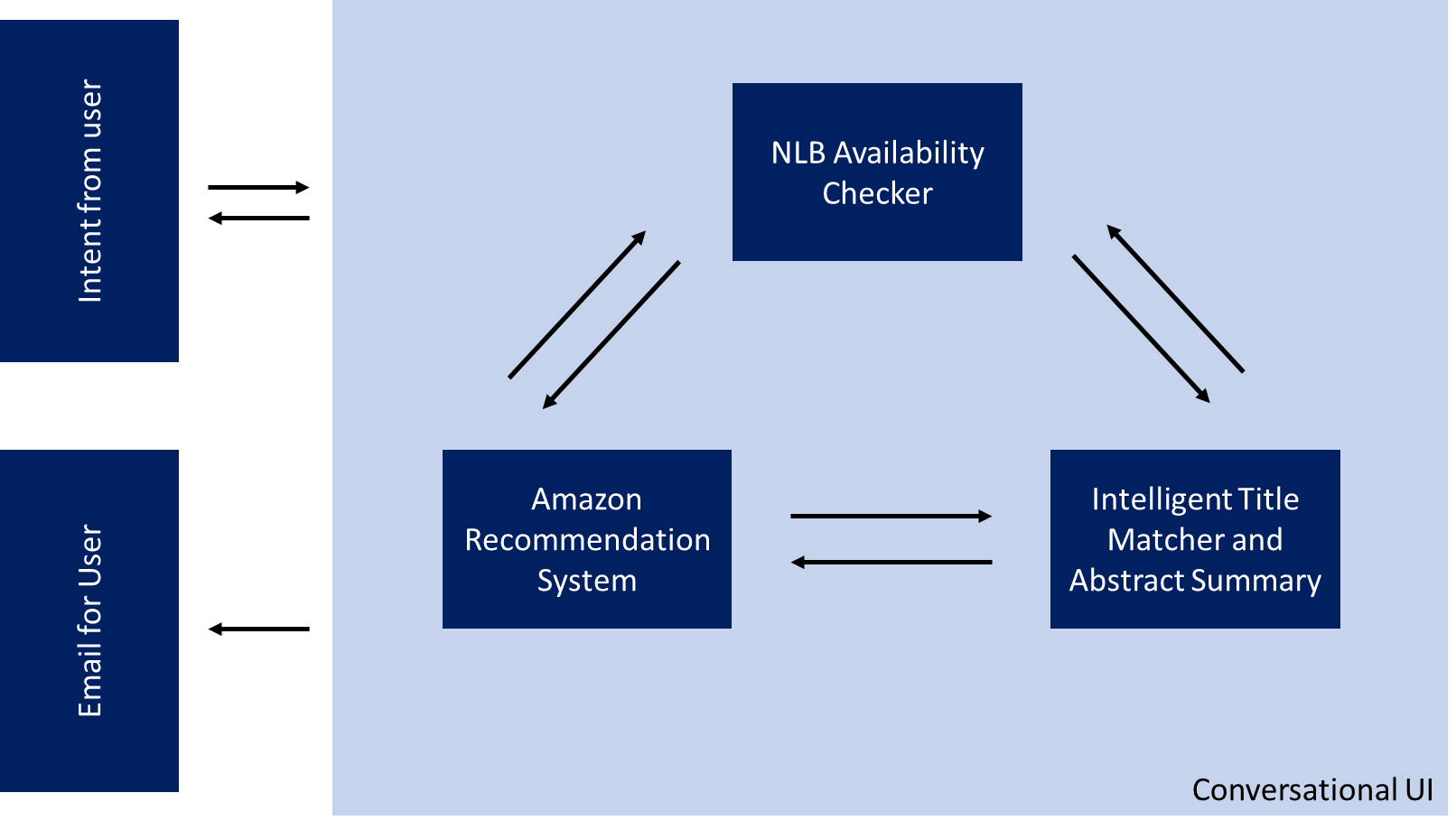


Figure : System Overview

An overview of the system in given in **Figure 2**. The following sub-sections summarise the major features of the application.

* 1. agent system: Conversational UI

Once the agent is activated using Google Assistant or Google Dialog Flow using their phone or desktop respectively. After greeting the user, the conversation UI will request for book titles to be provided. The UI allows for more than one book to search at one time by asking for more titles to be provided. The search and recommendation process will start once the user finishes his list of books, or when a maximum of three books are given.

If the user put in a request while the system is still processing their previous request, the conversational UI will also be able to inform the user that the system is busy. This is important as it will take a while for the RPA to scrape the information from the internet.

* 1. RPA: NLB Availability checker and abstract summariser

Based on the books that are being selected by the user through the Conversational UI, an RPA will be used to scrap the NLB website for the availability of the book across all book types, including ebook and audiobooks. An intelligent abstract summariser is also used to summarise the abstract into one or two sentences (150 characters) to give a flavour of the book when the email is sent. If the user is interested to find out more, the user will be able to follow the link to read the entire abstract.

* 1. RPA: amazon recommendation system amd intelligent title matcher

To provide for an intelligent recommendation based on the book that the user is interested to read. We made use of the amazon associative recommendation system to give suggestions to the user on the next books to borrow. It is determined that the associative purchases made by people who also bought this book served as good recommendations as there lies a commitment to purchase as compared to associative views made the same people. It is also observed that these recommendations are likely to be of similar genre and types instead of just being from the same author, which might not be very informative.

As NLB and Amazon both have their own proprietary search engine, we realised that the same search term might not give rise to the same results. Therefore, a intelligent title matcher is used to compare between the results given from NLB and Amazon to ensure the same books are being compared for recommendations.

* 1. RPA: Email agent

To summarise all the information and recommendations that is found by the application. An email is sent to the user. With this email, the user is able to verify their interest on the book using the summary provided while having a easy call to action by having a link to the borrowing page of NLB. Recommendations rlated to the books selected are also provided in the same email.

1. System IMPLEMENTATION
   1. agent system: Conversational UI
   2. Robotic Process automation
   3. local AI: intelligent title matcher & abstract Summariser
2. conclusion
   1. SUMMary of achievements
   2. Future ImprovementS

Despite a successful implementation for a minimum viable product, there are areas for future improvements.

**Appendix I: project proposal**

**appendix ii: SYSTEMS mapped to course objectives**

|  |  |  |
| --- | --- | --- |
| **System** | **Sub-System** | **Relevant Course Objectives** |
|  |  |  |

Task/RPA-bot OR Virtual Assistant OR other relevant robotic/intelligent process automation technologies

Local AI OR Cloud AI OR other relevant data-driven machine learning technologies

Single/Multi agent system OR other relevant agent based technologies, e.g. MyCroft AI; ACL

**Appendix Iii: SMARTLIBRARIAN installation and user GUIDE**

**Installation Guide**

1. Clone Github repository to location of choice

**Note:** Make sure file path does not have any spaces.

1. Download GoogleNews-vectors-negative300.bin from <https://drive.google.com/file/d/0B7XkCwpI5KDYNlNUTTlSS21pQmM/edit>

**Note:** This file is 3GB big

1. Extract(unzip) and place GoogleNews-vectors-negative300.bin into “DialogFlow” folder
2. Install system with Python 3.8.2.
3. Run “install.bat” to install all required python packages
4. If using own account and not the credentials provided, will need to import SmartLibrarian agent through the zip file provided in Github. If test is to be done on Google Assistant, integration setup with Google Assistant needs to be done under “Integrations” tab.

DialogFlow link: <https://dialogflow.cloud.google.com/>

For the provided credentials, all setup in dialogflow is done, including Google Assistant integration

1. Log in to gmail account using tagui browser which is used to send the NLB email

**User Guide**

1. Run “ngrok.bat”. Extract https tunnel link
2. Paste https link into dialogflow fulfilment. Press save. <https://dialogflow.cloud.google.com/#/agent/librarian-qusu/fulfillment>
3. Run “run.bat”

**Note:** Webhook takes ~6mins to initialize the models

1. SmartLibrarian is ready for use!
2. **[Test Platform]** Try it out using DialogFlow test console or, download Google Assistant on your device, log in using respective credentials, and initialize the agent by typing/saying “Talk to Smart Librarian”
3. **[Email Recipient]** By default, email recipient is set to the gmail account that is logged in. To change the email recipient of the results of the NLB search, go to “DialogFlow” folder and add in the email address in “email\_recipient.txt”

**Appendix Iv: SMARTLIBRARIAN sample usecases**

1. https://www.reportlinker.com/p05975423/Global-Online-Book-Services-Market-By-Category-By-Region-Industry-Analysis-and-Forecast.html?utm\_source=GNW [↑](#footnote-ref-1)
2. https://www.mordorintelligence.com/industry-reports/e-book-market [↑](#footnote-ref-2)
3. https://www.nlb.gov.sg/WhatsOn/Programmes/ProgrammesforAdults.aspx [↑](#footnote-ref-3)