RV COLLEGE OF ENGINEERING®, BENGALURU560059

(Autonomous Institution Affiliated to VTU, Belagavi)

DEPARTMENT OF COMPUTER SCIENCE ANDENGINEERING

A CONVERSATIONAL NEWS APPLICATION

FINAL REPORT

SUBMITTED BY

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in fulfillment for the requirement of 5th Semester

Software Engineering Laboratory Mini Project (18IS55)

Under the Guidance of

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Academic Year 2020- 2021

RV COLLEGE OF ENGINEERING®, BENGALURU - 560059
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

Certified that the project work titled **'A Conversational News Application'** is carried out by **CHETHAN S (1RV18CS046), BHAVYA BHAGERATHI (1RV18CS042),** who are bonafide students of RV College of Engineering®, Bengaluru, in fulfillment of the curriculum requirement of 5th Semester Software Engineering Laboratory Mini Project during the academic year **2020-2021**. It is certified that all corrections/suggestions indicated for the internal Assessment have been incorporated in the report deposited in the departmental library. The report has been approved as it satisfies the academic requirements in all respect's laboratory mini-project work prescribed by the institution.

Signature of Faculty In-charge

Head of the Department
Dept. of CSE, RVCE

External Examination

Name of Examiners	Signature with date
1	
2	

ACKNOWLEDGEMENT

Any achievement, be it scholastic or otherwise does not depend solely on the individual efforts but on the guidance, encouragement and cooperation of intellectuals, elders and friends. A number of personalities, in their own capacities have helped me in carrying out this project work. I would like to take this opportunity to thank them all.

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Abstract

Newspapers have been a constant source of news and information for us from more than 100 years now. Many technological advancements led to newer ways of delivering news and information about various aspects. We are searching our interests in news manually but in this we are planning to make it conversational and interactive using the ALAN voice assistant. The web app will be completely interactive and the user is able to get news from any topic of interest just by speaking.

There are some News applications where the user can get latest news but he/she has to pay for that. And also, the user has to search the news by typing his/her interest. So, every time he/she has to type the words manually.

We are developing a web application which is fully voice controlled. With great advancements in AI, we have offered an approach for development in the field of news technology. In this project, we have used Alan AI to help get the user some news that they desire to know about. The user can access news by category, popular news channels, by terms, etc. We will be using ReactJS, JavaScript, Visual Studio Code, and Alan AI for developing this project. With rapid advancements in computing technology, we have achieved steps closer to developing Artificial Intelligence (AI). AI sometimes also called Machine Intelligence is a revolutionary branch of computer science, capable of performing tasks that were thought to be impossible for a machine. The term “Artificial Intelligence” was coined at the Dartmouth college in 1956 and has seen a huge demand as it seems to be the future of computing.

Table of Contents

Table of Figures

Chapter 1: Introduction

1.1 Objectives

- To provide an online interface to the users where they can request any kind of news.
- To provide an AI based web application to fetch required news.
- To provide a voice-based news application which has capacity to communicate with user.
- To build an interactive news application which is a open source and free of cost.

1.2 Scope

As we know it is very important for us to know about what happening around us. It is more convenient, as you can access information from anywhere, and at any time, through computers or other mobile devices such as phones and tablets. It is user friendly and true news will be provided to the users because the news will be taken from popular news channels like CNN. We are here to provide news for free of cost.

With great advancements in AI, we have offered an approach for development in the field of news technology. In this project, we have used Alan AI to help get the user some news that they desire to know about. When a user asks Alan about a topic, the AI synthesizes their speech into commands that can then be used to gather information from various applications. We have used ReactJS to develop the front-end of this application and JavaScript for behind-the-scenes operations. Visual Studio Code was our editor of preference. Adding all these technologies together, we progressed to building a hands-on project. With rapid advancements in computing technology, we have achieved steps closer to developing Artificial Intelligence (AI). AI sometimes also called Machine Intelligence is a revolutionary branch of computer science, capable of performing tasks that were thought to be impossible for a machine. The term “Artificial Intelligence” was coined at the Dartmouth college in 1956 and has seen a huge demand as it seems to be the future of computing.

Chapter 2: Software Requirement specification

2.1 Introduction

2.1.1 Purpose

Newspapers have been a constant source of news and information for us from more than 100 years now. Many technological advancements led to newer ways of delivering news and information about various aspects. We are searching our interests in news manually but in this we are planning to make it conversational and interactive using the ALAN voice assistant. The web app will be completely interactive and the user is able to get news from any topic of interest just by speaking. The user can access news by category, popular news channels, by terms, etc. We will be using ReactJS, JavaScript, Visual Studio Code, and Alan AI for developing this project.

2.1.2 Document Conventions

Type face	**Indicates**
Font	Times New Roman
Bold	Mainly for headings and are numbered properly
Italics	Mainly Used in References
Blue-Underline	Used for URLs

2.1.3 Intended Audience and Reading Suggestions

Information in this document is at a level that can be reviewed and understood by the different People. The documents people include- Developers, Team Members, Engineers.

2.1.4 Product Scope

This web application system will be an online voice-controlled news application. Since almost everyone read the news every day to enrich their knowledge and keep themselves updated. People read newspapers, watch news channels and also read articles in search of their interest. So here we have gathered all in one platform.
No need to search everywhere just have to use our application. This application will be deployed on the internet so everyone can make use of this.

2.2 Overall Description

2.2.1 Product Perspective

This is a voice-based news application that is capable of providing latest and true news. The user can access news by category, popular news channels, by terms, etc.

2.2.2 Product Functions

- User can use our application without any login credentials.
- User should click on the mic icon and request any news through voice.
- User can search news by terms, category, or by any news sources.
- User can even search the latest news.
- After the user request for news the application process the request and show the news of his/her interest. Then the user can ask the application to read the headlines.
- While the application is reading the headlines, the user can interrupt in the middle and ask it to open his/her interested article.
- Other than news requests the user can make casual request like “how are you”, “what you can do for me”, etc.

2.2.3 User Classes and Characteristics

The user may have the basic knowledge about computer and internet. So that they can use this web application.

2.2.4 Operating Environment

This Application will run over all Kind of operating system (Windows XP, vista, win- 07, win-10 Linux, Ubuntu etc.) containing web browser.

2.2.5 Design and Implementation Constraints

The News application shall be a Web application system running over web browser environment. The system shall be developed using ReactJs and JavaScript.

2.2.6 Assumptions and Dependencies

This system will be an open source web application it doesn’t need any login or authentication. But all it need is an active internet connect.

2.3 External Interface Requirements

2.3.1 User Interfaces

The Interface will be in the form of a webapp. It is designed to be functional and minimal in its styling. All news options will be displayed in a description format. The front-end part of the project was implemented using ReactJS and Material UI. It is open-source and based on JavaScript. HTML and CSS will be used to setup the page layout and add minimal styling to make the interface user friendly. A mic icon will be provided to the user so that they can interact with the application with their voice.

2.3.2 Hardware Interfaces

- Processor : Pentium 3 or above
- System bus : 32 bit/ 64 bit
- Ram : 256 MB or more
- HDD : 40 GB
- Monitor : SVGA color
- Keyboard : 101 Keys
- Modem : 56 Kbps/broadband or Mobile Hotspot
- Mouse : PS2/serial/USB
- Mic : System built/K668
- Speaker : System built/2.1 version

2.3.3 Software Interfaces

The server will be hosted using Apache Webserver (Version 2.2.17). Main backend processing will be done using JavaScript including connecting to and accessing the news using API's and processing requests and ALAN AI Studio for Backend programming.

2.3.4 Communications Interfaces

The main communication protocol will be Hyper Text Transfer Protocol (HTTP) and JavaScript. This will be used to transfer information back and forth from the user to the Alan. Alan studio API and also news API's will be used to send the information over the web browser.

2.4 Functional Requirements

- **Capable to Receive audio signals:** The voice interface instance should be able to receive a Human audio stream.
- **Conversion of signal:** Convert audio signals to commands.
- **Classify request signal:** The voice interface instance should be able to classify the whether the request asked is comes under the domain or not.
- **Processing the request:** If the request comes under domain then process it or else Reply with small message.
- **Match the request:** Match the request with appropriate reply or action (fetching and reading requested news).
- **Digital Signal Processing (DSP):** capable of converting symbolic information it receives from News API into audible and intelligible speech.

2.5 Nonfunctional Requirements

2.5.1 Performance Requirements

The physical machine to be used in the News application needs to have internet access in order to connect to the ALAN AI Studio.

2.5.2 Reliability

Since we are going to deploy the application it can be used via any system from any location and at any time.

2.5.3 Availability

Application can be made use at any time in the system satisfying the requirements.

2.5.4 Maintainability and Portability

Maintenance is easy and economical. This system can be run on any operating system including Windows, Linux and Mac but should have an active internet connection

Chapter 3: Architectural Design

The software needs the architectural design to represents the design of software. IEEE defines architectural design as “the process of defining a collection of hardware and software components and their interfaces to establish the framework for the development of a computer system.” The software that is built for computer-based systems can exhibit one of these many architectural styles.

Each style will describe a system category that consists of:

- A set of components (ex: a database, computational modules) that will perform a function required by the system.
- The set of connectors will help in coordination, communication, and cooperation between the components.
- Conditions that how components can be integrated to form the system.
- Semantic models that help the designer to understand the overall properties of the system.

3.1 API Architecture

The Application Programming Interface, API is a messenger that takes requests and tells a system what the user wants and then returns the response. Hence it is a software that provides a foundation for connection between two applications. This connection is then used to send requests from one application to another and get a response in return. An API is the real backend connectivity engine between various other applications.

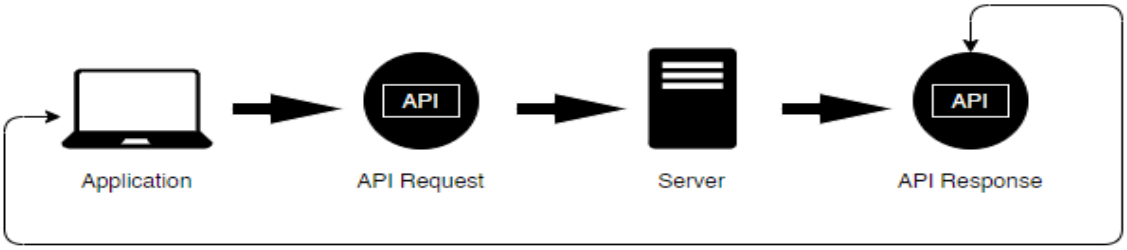

Fig. 1: API Architecture

In this project, we have used two APIs. Every application has its API key to connect with your application. The two keys were from News API and Alan AI. Using the News API, one can search and retrieve accurate and current on-going news across the globe. A lot of query sets are available, one can search and retrieve news by terms, category, or by any news sources. The developer can customize the query for the particular regions for the news. This HTTP REST API allows the developer to access quick news as per the request. The frontend was developed according to the features of this API as there are cards according to the news by terms, category, or by any news sources.

3.1 Architecture of News Application

Alan Conversational Platform lends strong support for your app by providing it's easy to integrate SDK, JavaScript scripting Alan Studio to customize Alan according to our application. The Alan Studio provides a testing tool where the developer can debug the JavaScript commands. The Alan button doesn't interfere with the User Interface of the application and can be placed anywhere dynamically just by swiping or moving it using the mouse. The cloud handling makes it even more powerful as it is managed by Alan Studio itself. The developer doesn't need to work on the data security and isolation as the cloud handles it with ease.

The simple integration of Alan SDK lets the developer use it with various technologies such as Web, iOS, Android, Ionic, Flutter, Electron, Angular, React, Vue, Ember, and Vanilla JS. The scripting for this project was based on the news requirement. Commands like "Give me the latest news from BBC", "What's up with COVID 19", and more were scripted. The voice assistant is completely scripted to read out all the headlines of the news that the user searched for. While reading the article headlines, the frontend of the project highlights the article by a blue bar below it. The user can ask to open any article to read in depth about that article. The project redirects to the news article when the user asks to open an article of their choice. The project gives Alan some more added functionalities like small talk and mathematical calculations.

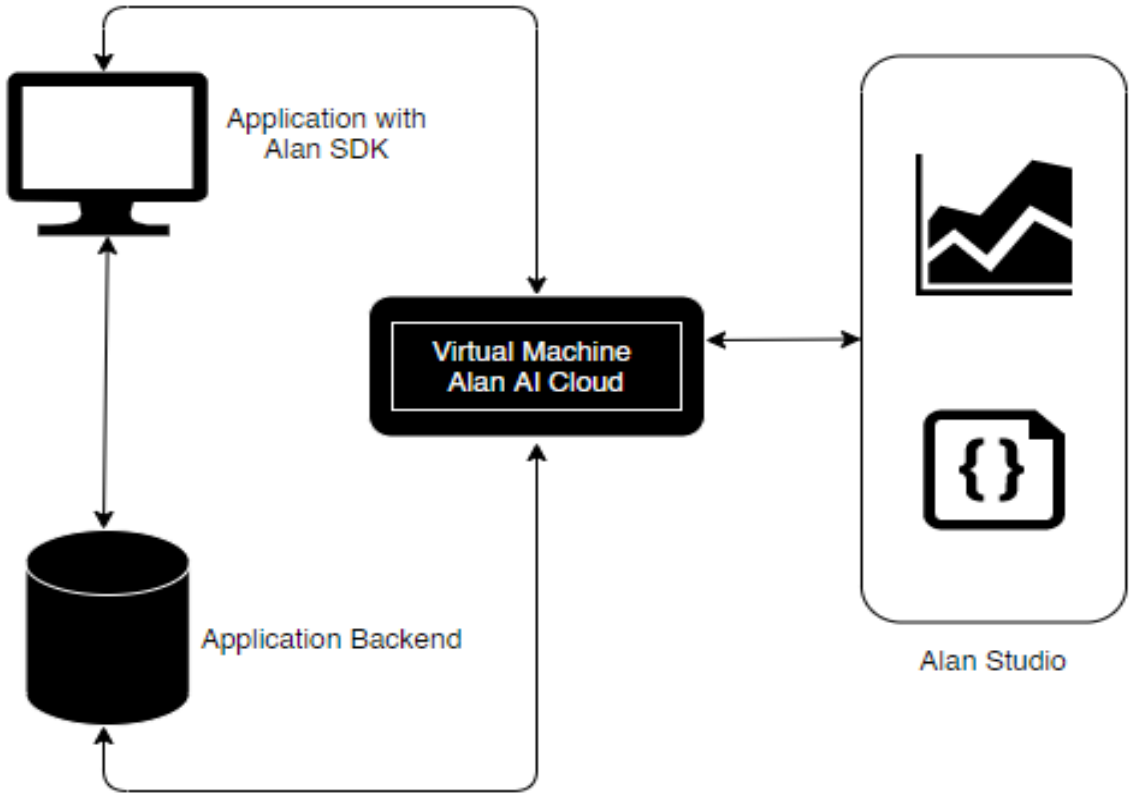

Fig. 2: Architecture of News Application

Chapter 4: Detailed Design

4.1 Class Diagram

Class diagram shows a collection of classes, interfaces, associations, collaborations, and constraints. It is also known as a structural diagram. The **class diagram** is the main building block of object-oriented modeling. It is used for general conceptual modeling of the structure of the application, and for detailed modeling translating the models into programming code. **Class diagrams** can also be used for data modeling.

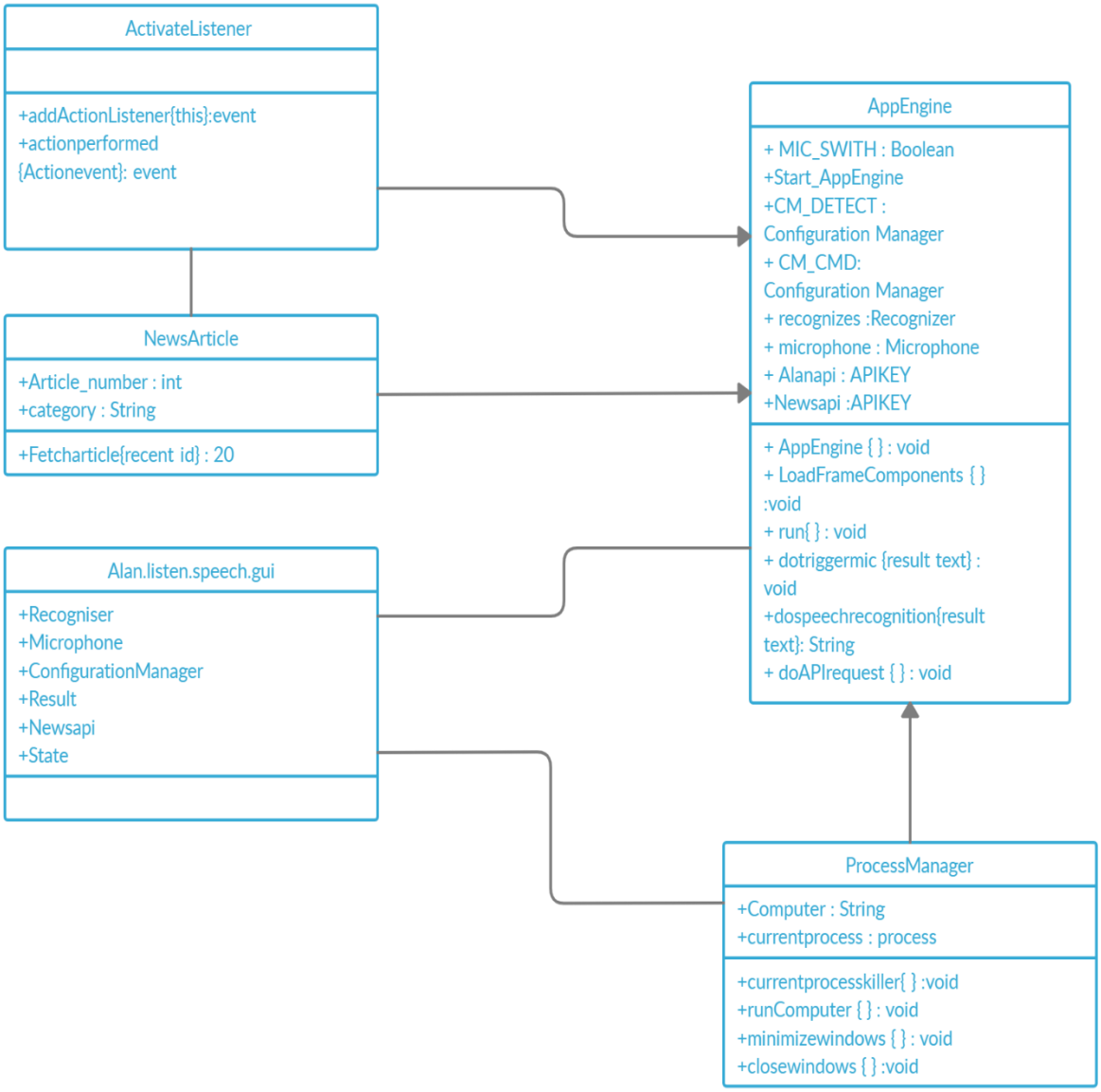

Fig. 3: Activity Diagram for Processing User Request.

4.2 Dataflow Diagram

The flow of data of a system or a process is represented by DFD. It also gives insight into the inputs and outputs of each entity and the process itself. DFD does not have control flow and no loops or decision rules are present. Specific operations depending on the type of data can be explained by a flowchart. Data Flow Diagram can be represented in several ways. The DFD belongs to structured-analysis modeling tools. Data Flow diagrams are very popular because they help us to visualize the major steps and data involved in software-system processes.

4.2.1 Level-0 DFD

In level-0 DFD shows the basic interaction of user with the application and the interaction of application with the user.

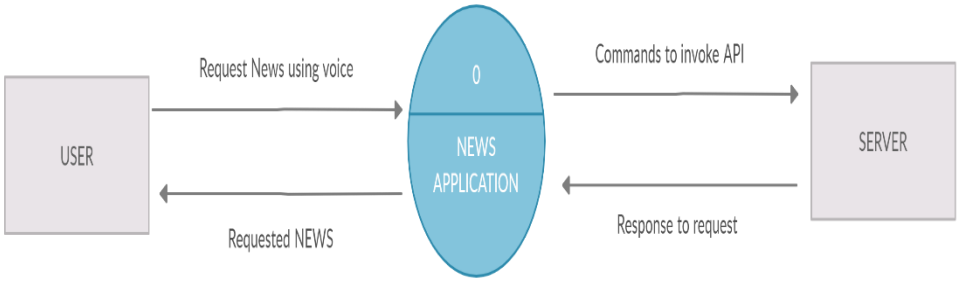

Fig. 4: LEVEL 0 DFD For A conversational News Application

4.2.2 Level-1 DFD

In level-01 DFD shows how the user input is taken based on voice recognition and then that is converted to API commands to fetch the news using News API.

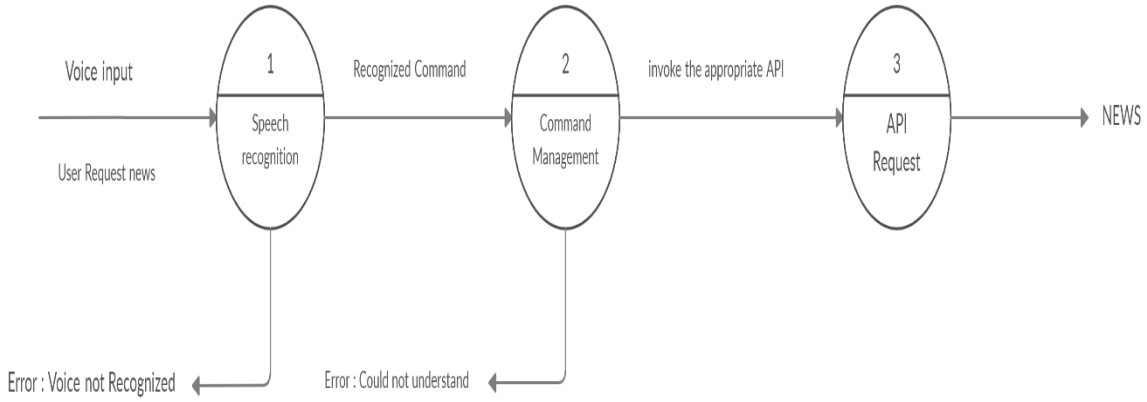

Fig. 5: LEVEL 1 DFD For A conversational News Application

4.2.3 Level-2 DFD

In level-02 DFD it shows how the user voice is recognized and also how the news fetched based on the category of news. It also describes the various tasks that user can perform using his voice as an input.

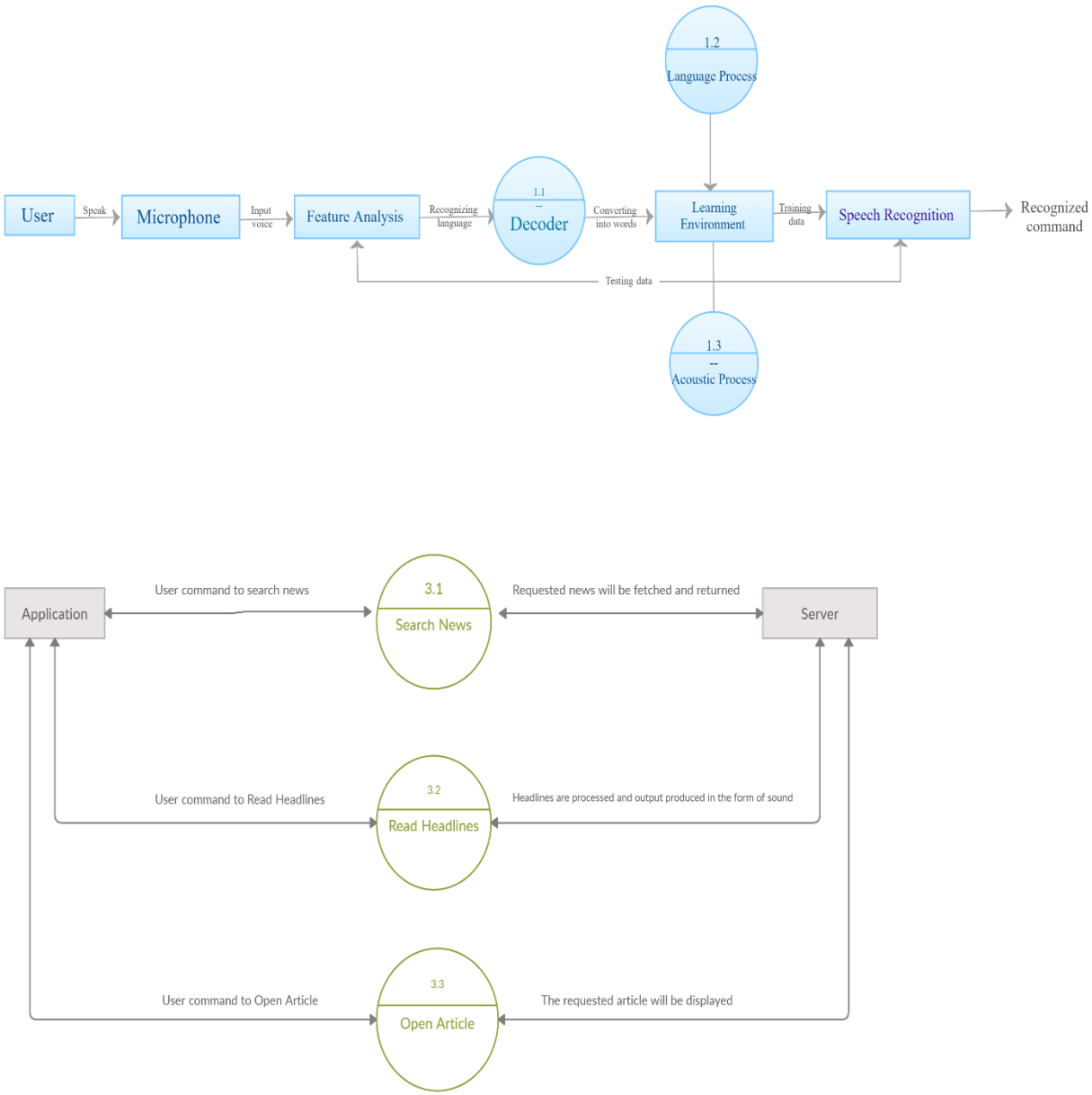

Fig. 6: LEVEL 2 DFD For A Conversational News Application

4.3 Activity Diagram

An activity diagram portrays the control flow from a start point to a finish point showing the various decision paths that exist while the activity is being executed. We can depict both sequential processing and concurrent processing of activities using an activity diagram. They are used in business and process modelling where their primary use is to depict the dynamic aspects of a system.

4.3.1 Activity Diagram for News Request

In this activity diagram it is shown that how the user request news of his choice and then the requested news is fetched from News API and displayed in the web application.

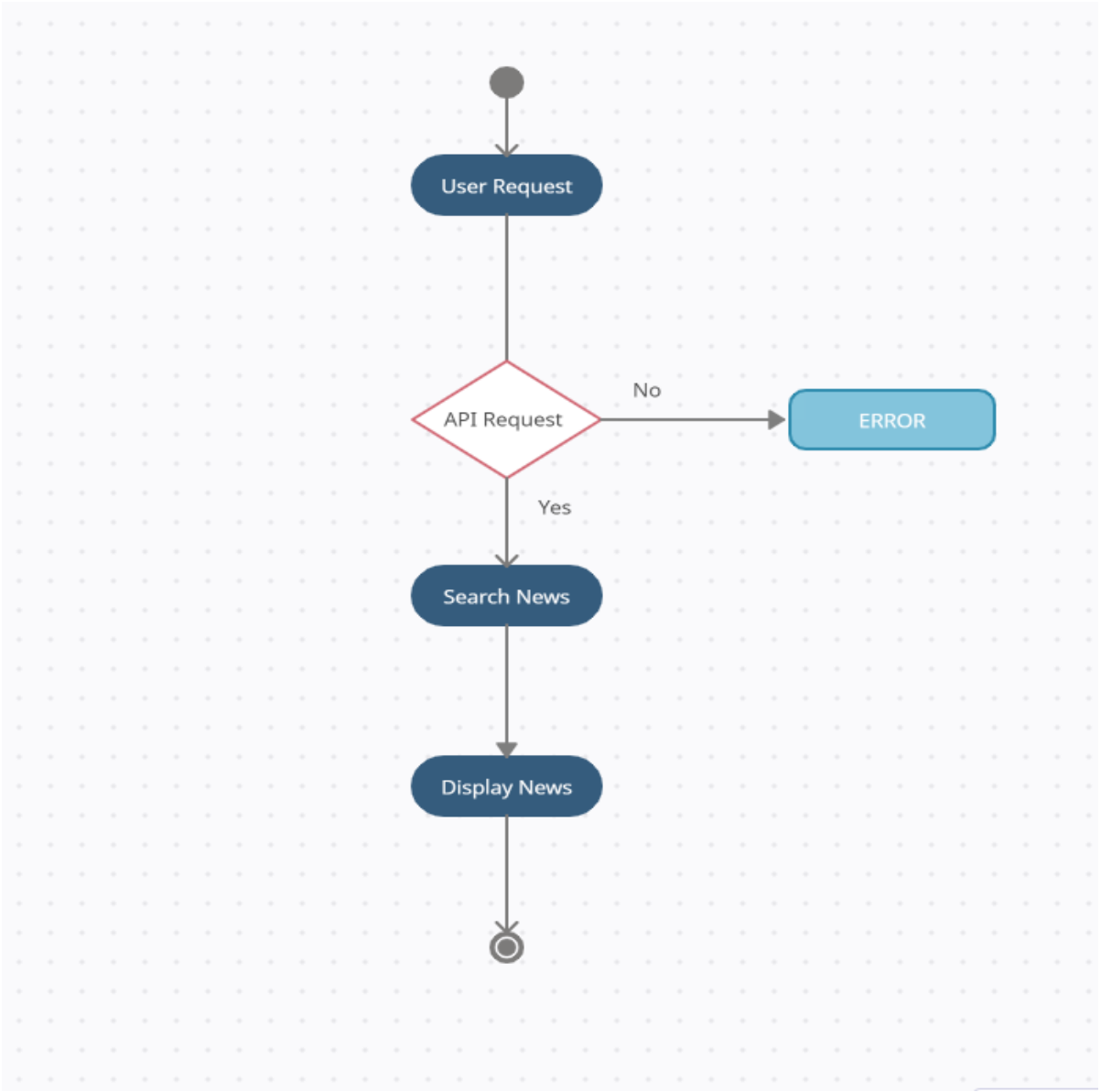

Fig. 7: Activity diagram for Requesting News

4.3.2 Activity Diagram for Processing User Request

Here it is shown how the request is processed. i.e. first the user voice is recognized and then that speech is converted to text and then it is converted into API commands and the respective news is fetched from news.org website using News API.

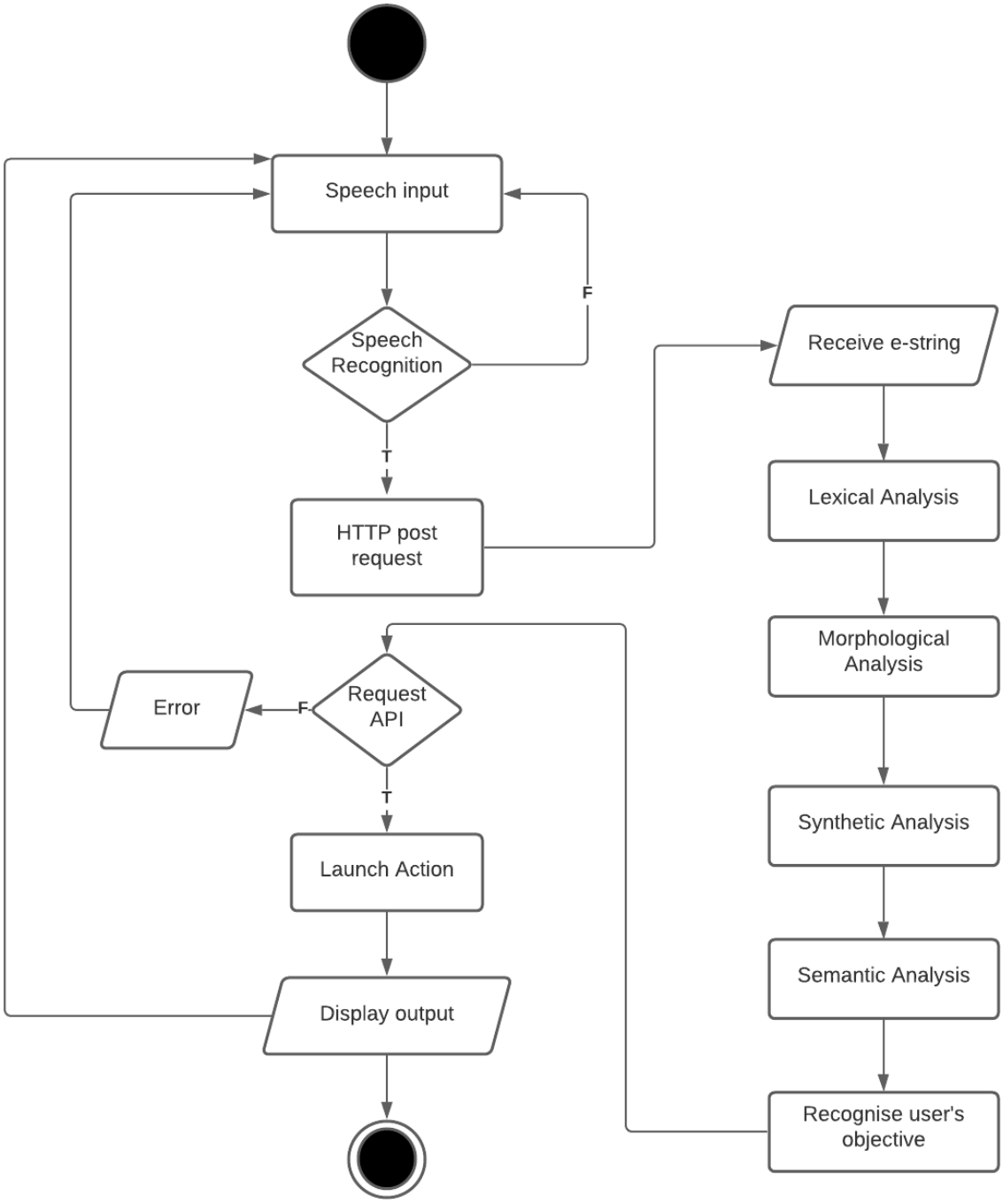

Fig. 8: Activity Diagram for Processing User Request.

4.4 Sequence Diagram

A **sequence diagram** shows object interactions arranged in time sequence. It depicts the objects involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. Sequence diagrams are typically associated with use case realizations in the Logical View of the system under development. Sequence diagrams are sometimes called **event diagrams** or **event scenarios**.

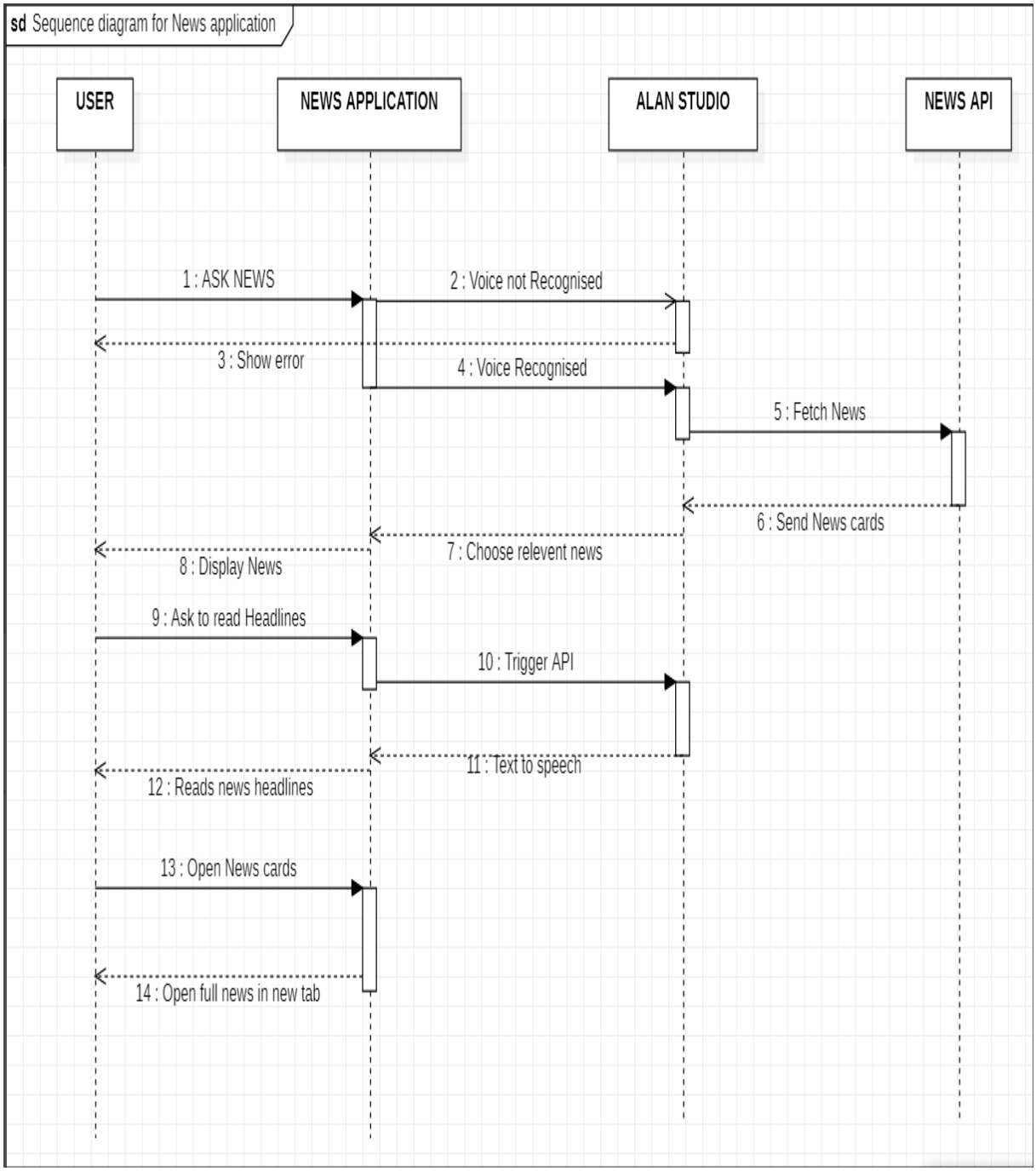

Fig. 9: Sequence Diagram for Processing User Request.

4.5 Use case Diagram

A **use case diagram** at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use case diagram can identify the different types of users of a system and the different use cases and will often be accompanied by other types of diagrams as well. The use cases are represented by either circles or ellipses. Use case diagrams are used to gather the requirements of a system including internal and external influences. These requirements are mostly design requirements. Hence, when a system is analysed to gather its functionalities, use cases are prepared and actors are identified.

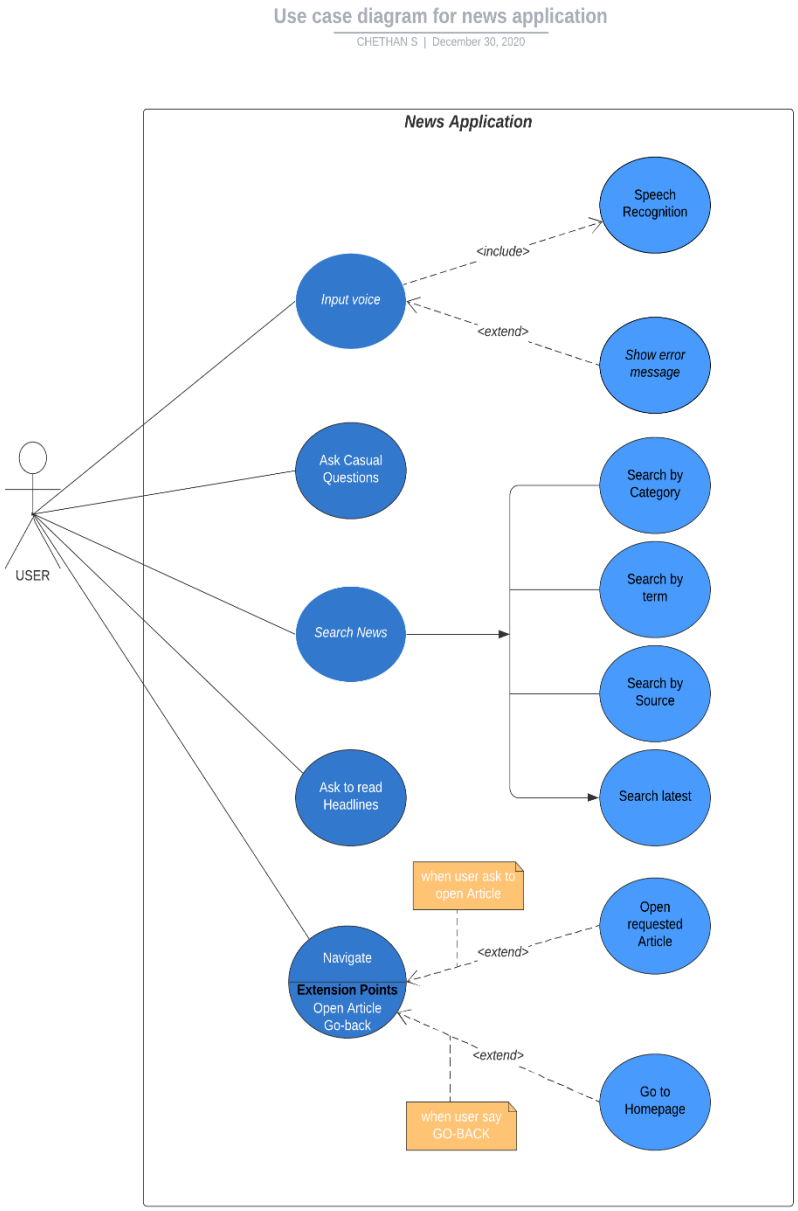

Fig. 10: Use case Diagram for Processing User Request.

Chapter 5: Implementation

5.1 Development Process

Iterative model was used for development of our project i.e. it was built incrementally and enhancing the features after every increment thereby meeting the desired requirements. As the requirements were clearly understood as to what has to be built as the final product we opted for an iterative process and also since both frontend and backend had to be built, it would have had to go back to previous steps if we had opted for a waterfall approach. It took two iterations for the project to be built completely.

First Iteration

Module	Purpose
Building front - end	The front-end part of the project was implemented using ReactJS and Material UI. It is open-source and based on JavaScript.
Building back - end	The back-end was designed using ALAN Studio, News API, Javascript and HTTP.

Second iteration

Module	Purpose
Alan Studio	It was used for training the news application for answering various queries. It was also trained to fetch news using News API.
Division of news categories	The news is divided into various categories and fetched according to the user's interest.
API connections	These connections are managed by newsapi.org and Alan API.
Alan SDK	The simple integration of Alan SDK lets the developer use it with various technologies such as Web, iOS, Android, etc.

5.2 Deployment and Hosting

Since We are developing a web application it should be deployed and hosted on the internet so that everyone can make use of it and can access it using any device which has an internet browser. So, the application is deployed and hosted using Netlify- a San Francisco-based cloud computing company that offers hosting and serverless backend services for web applications and static websites.

Chapter 6: Testing

Software Testing is a method to check whether the actual software product matches expected requirements and to ensure that software product is Defect free. It involves execution of software/system components using manual or automated tools to evaluate one or more properties of interest. The purpose of software testing is to identify errors, gaps or missing requirements in contrast to actual requirements. Some prefer saying Software testing as a White Box and Black Box Testing. In simple terms, Software Testing means the Verification of Application Under Test (AUT).

Test planning, the most important activity to ensure that there is initially a list of tasks and milestones in a baseline plan to track the progress of the project. It also defines the size of the test effort. It is the main document often called a master test plan or a project test plan and usually developed during the early phase of the project.

Benefits:

The goal of unit testing is to isolate each part of the program and show that the individual parts are correct. A unit test provides a strict, written contract that the piece of code must satisfy. As a result, it affords several benefits.

1) Find problems early: Unit testing finds problems early in the development cycle. In test-driven development (TDD), which is frequently used in both extreme programming and scrum, unit tests are created before the code itself is written. When the tests pass, that code is considered complete. The same unit tests are run against that function frequently as the larger code base is developed either as the code is changed or via an automated process with the build. If the unit tests fail, it is considered to be a bug either in the changed code or the tests themselves. The unit tests then allow the location of the fault or failure to be easily traced. Since the unit tests alert the development team of the problem before handing the code off to testers or clients, it is still early in the development process.
2) Facilitates Change: Unit testing allows the programmer to refactor code or upgrade system libraries at a later date, and make sure the module still works correctly (e.g., in regression testing). The procedure is to write test cases for all functions and methods so that whenever a change causes a fault, it can be quickly identified. Unit tests detect changes which may break a design contract.
3) Simplifies Integration: Unit testing may reduce uncertainty in the units themselves and can be used in a bottom-up testing style approach. By testing the parts of a program first and then testing the sum of its parts, integration testing becomes much easier.

4) Documentation: Unit testing provides a sort of living documentation of the system. Developers looking to learn what functionality is provided by a unit, and how to use it, can look at the unit tests to gain a basic understanding of the unit's interface (API). Unit test cases embody characteristics that are critical to the success of the unit. These characteristics can indicate appropriate/inappropriate use of a unit as well as negative behaviors that are to be trapped by the unit. A unit test case, in and of itself, documents these critical characteristics, although many software development environments do not rely solely upon code to document the product in development

6.1 Development Process

SYSTEM TESTING is a level of testing that validates the complete and fully integrated software product. The purpose of a system test is to evaluate the end-to-end system specifications. This section contains the detailed listing of the test cases tested for Online food ordering system: These test cases are used for system level testing. The basic operations present in the software are

1. Requesting Latest News
2. Requesting news by category (ex: Sports, Technology, etc.)
3. Request news by term (ex: Corona, iPhone, etc.)
4. Request news from any source (ex: BCC, CNN, etc.)
5. Open requested news card

Test ID	**Purpose**	**Tests**	**Expected Result**	**Actual Result**	**Test Result**
1	Enter Application URL	Open URL “https://smart-news-application.netlify.app/”	The application should get opened in any browser.	The application opened in chrome, Firefox, Avast-browser.	PASS
2	Requesting Latest News	Click on mic icon and ask “give me the latest news”	Application should display News cards containing Latest News.	Application displayed News cards containing Latest News.	PASS

3	Requesting News by category	Click on mic icon and ask “give me the technology news”	Application should display News cards containing Technology News.	Application displayed News cards containing Technology News.	PASS
4	Requesting News by term	Click on mic icon and ask “what’s up with iPhone”	Application should display News cards containing iPhone News.	Application displayed News cards containing iPhone News.	PASS
5	Requesting News from different Sources.	Click on mic icon and ask “Give me the news from CNN”	Application should display News cards containing News from CNN.	Application displayed News cards containing News from CNN.	PASS
6	Open Requested News	Click on mic icon and say “Open article number 1”	Application should open the detailed news in new tab.	Application opened the detailed news in new tab.	PASS

6.2 Component Testing

Component testing is defined as a software testing type, in which the testing is performed on each individual component separately without integrating with other components. It's also referred to as Module Testing when it is viewed from an architecture perspective. This section contains the detailed listing of the test case. These test cases are used for component level testing. The basic components present in the software are:

1. App backend Integration
2. GUI of App
3.Alan studio

Test ID	Purpose	Tests	Expected Result	Actual Result	Test Result
1	Graphical User Interface	1. Accessibility of All the scenes 2. Test the Mic-buttons. 3.Capability to display requested news	1. Every page on UI should be accessible 2. Button should be responsive on click and take user voice as input 3.GUI should Capable of Displaying the fetched news in form of cards.	1. Every page on UI is fully accessible 2. Button is responsive on click and takes user voice as input 3.Capable of Displaying the fetched news in form of cards.	PASS PASS PASS
2	Alan studio	1.Taking user voice as input and process it. 2.Training the application with various queries. 3.Fetching requested news using API's.	1.Alan studio should Capable of taking user voice as input and process it. 2. Alan studio should Capable of training the application with various queries. 3. Alan studio should Caple of fetching requested news using API's.	1.Capable of taking user voice as input and process it. 2. Capable of training the application with various queries. 3.Caple of fetching requested news using API's.	PASS PASS PASS

6.3 Risk management Plan

S.no	Risk	Probability	Impact	Mitigation Plan
1	UI not fully acceptable as not specified in SRS	high	high	Must build another GUI and integrate it with Alan studio
2	Quality may not be good	medium	medium	Using tools like Junit for Unit Testing
3	Failure to access web database	low	high	Having good internet connection or offline services, wherein the data is restored when the connection is retrieved.

Chapter 7: Conclusion & Future Enhancement

7.1 Conclusion

Reading newspapers takes up a lot of time and the reader usually spends reading about articles in which they are not interested. By using this project, the user can get to hear about all the important headlines of their chosen topic on the go, in just 5 minutes. The project is capable of reading all the headlines of the news articles and can open the source article for more in-depth reading if required by the user. Alan voice assistant can be integrated into many more applications in the field of health-care, business, banking, and e-commerce applications. As far as news applications are concerned, we suggest that the integration of voice assistants in news applications will not only enhance the user experience but also make news more engaging in the near future. We hereby have successfully completed our project and conclude our research.

7.2 Future Enhancement

In future this news application can be used as a component for any application assistance like google assistance. This application can be integrated with hardware and a speaker to form a news reader which is portable.

Chapter 8: Screenshots and References

8.1 Screenshots

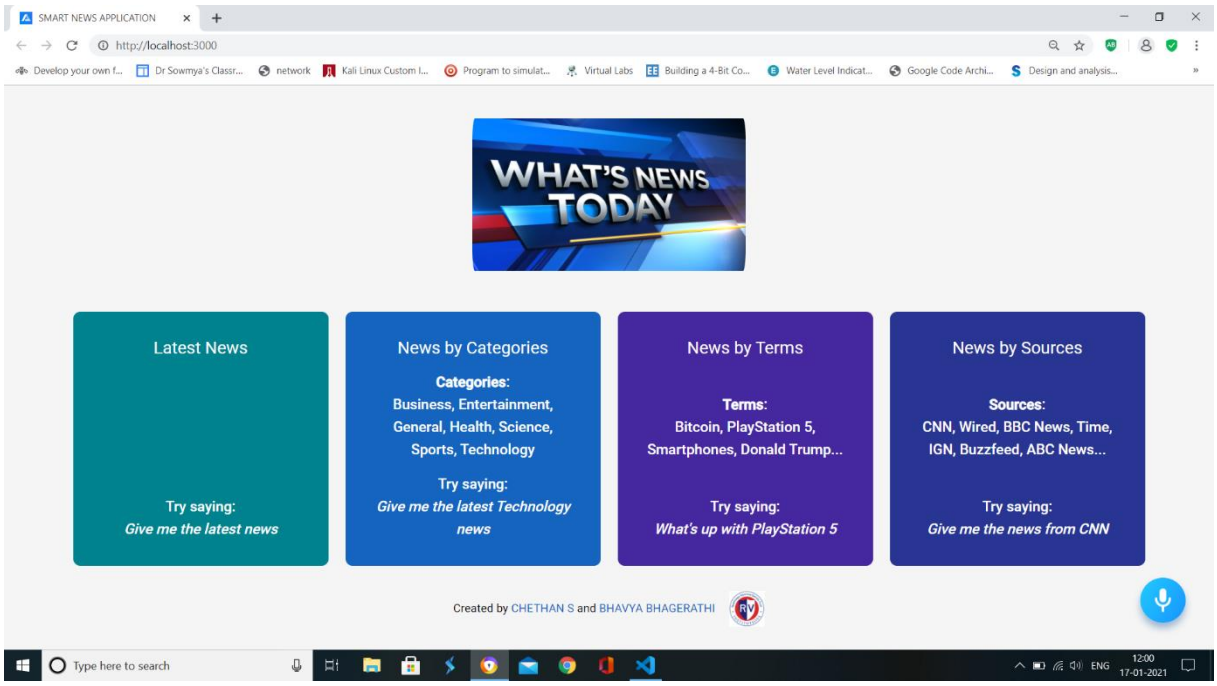

Fig.11: Home page for News Application

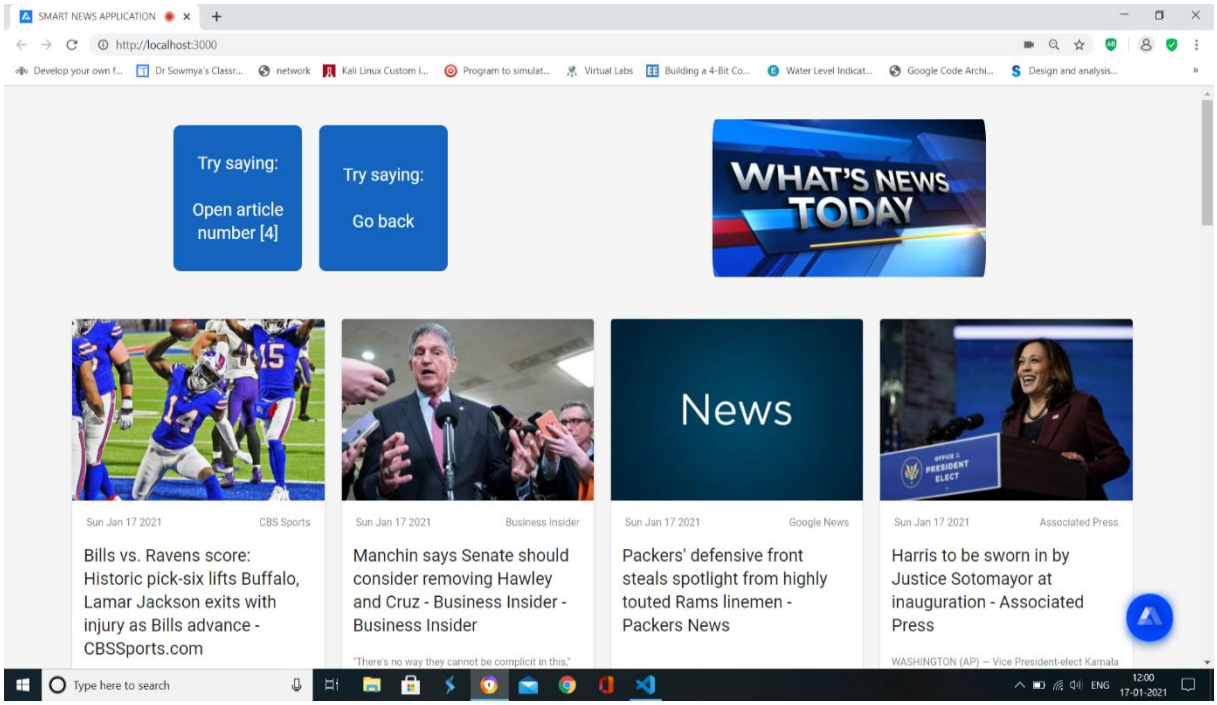

Fig. 12: latest news fetched from news API

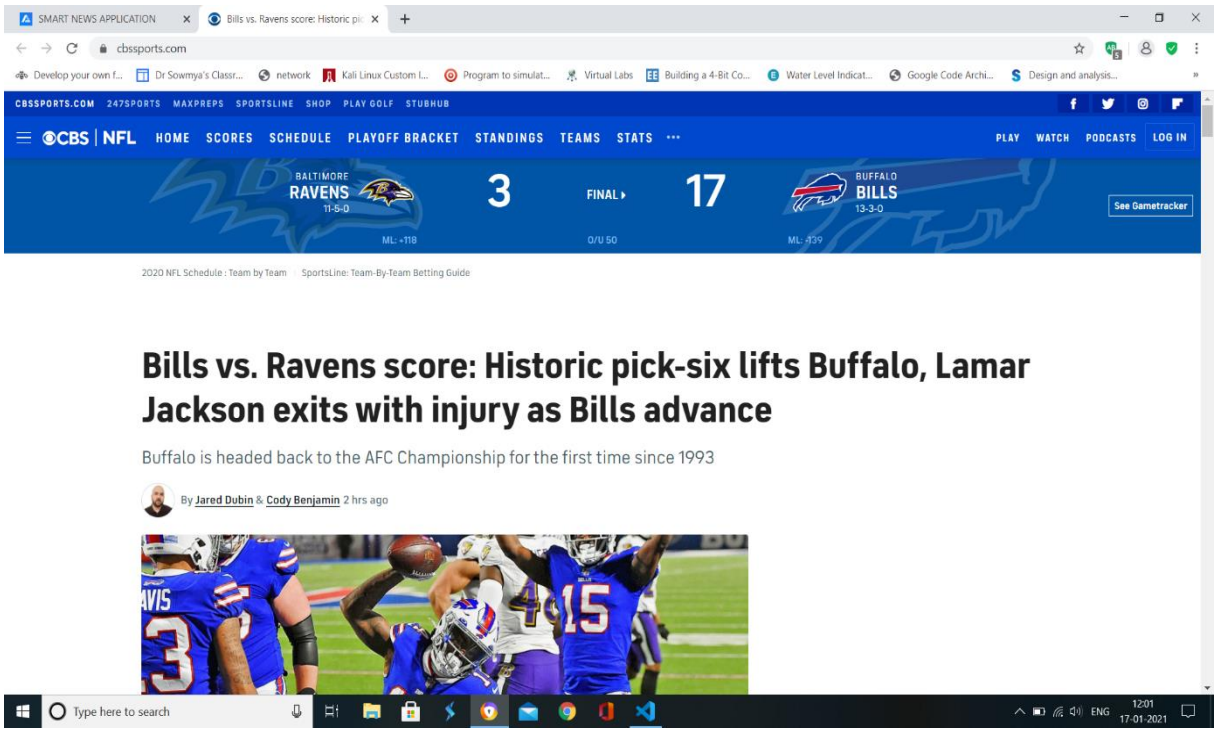

Fig. 13: Detail news opened in new window

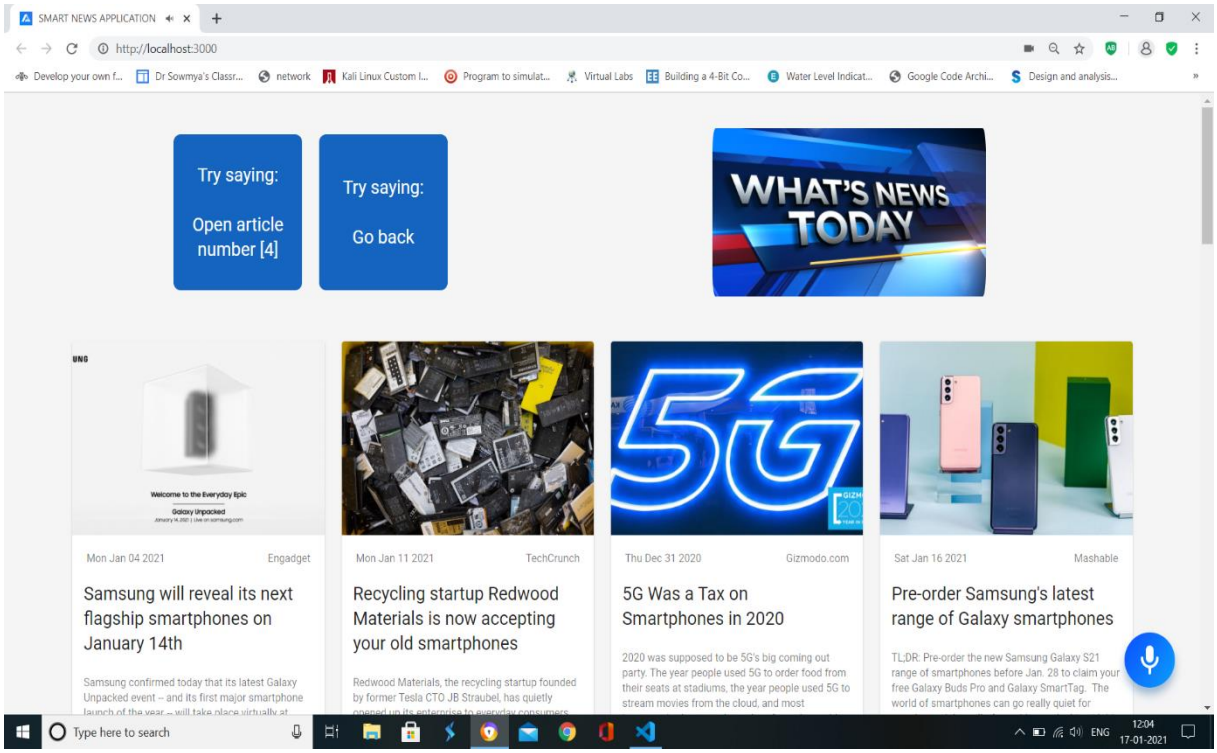

Fig. 14: News cards fetched from News API

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