

# Memory Assistance

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**Abstract:-** It is worth noting that lifestyle changes can have adverse effects on people's health, and amnesia is one of the health issues that may arise. Amnesia is characterized by the partial or complete loss of memory, caused by factors such as brain injury, disease, or psychological trauma, which can cause difficulty in recalling past events or forming new memories. To address this, a research paper suggests a system called "Memory Assistance" that includes features like face recognition, games, to-do lists, memory albums, and diaries to promote independence for individuals with amnesia. Among these features, face recognition plays a crucial role in identifying familiar faces. The system utilizes a Siamese network, a neural network architecture known for its ability to compute similarity between inputs, such as images or data points. This network can be trained with limited labeled data and finds applications in various fields such as face recognition, computer vision, and information retrieval. The Memory Assistance system aims to provide support and enhance the quality of life for individuals experiencing memory impairment.

**Keywords:-** Amnesia, Face Detection, Face Recognition, Memory Assistance, Siamese network.

## I. INTRODUCTION

Amnesia is a condition characterized by the inability to remember certain events or information. Amnesia caused by neurological disorders such as Alzheimer's disease and other forms of dementia affects many elderly people. In the United States, it is estimated that around 5.8 million people have Alzheimer's disease. Amnesia patients face several difficulties in remembering people, places, events, to do things etc. So, this paper gives a solution to the amnesia patients by providing a website named "Memory Assistance". Memory Assistance is a website which is used to the amnesia patients by providing them the features of "Face Recognition", "Games", "Todolist", "Memory album", "Diary". The website is designed by using the latest technology namely "Flask", "PyTorch" which is a Deep Learning Framework based on Torch and it uses the Mongo dB to store and retrieve the data. Deep learning is a machine learning technique inspired by the neural network of the human brain. It uses supervised and unsupervised algorithms to train outputs based on inputs, with GPU acceleration facilitating multiple complex calculations simultaneously. PyTorch is a popular open-source library that is highly flexible and speedy in implementing deep neural networks, offering dynamic computation graphs that are entirely Pythonic. MongoDB is a NoSQL Server with schemaless data storage, featuring high performance, scalability, availability, and flexibility, and can be hosted on various cloud platforms such as Google Cloud, Microsoft Azure, and Amazon Web Services. Flask, a micro web framework in Python, is commonly used to build web applications that incorporate deep learning models, providing simple, flexible,

and scalable web APIs that facilitate communication between the model and application.

Face recognition feature helps the user by identifying familiar faces. The module is made up of two sub models: one that detects faces and one that recognizes them. For face detection, we utilized face detection from the opencv haar cascade. For face recognition, we built a Siamese network to identify the dissimilarity of the faces; the more similar two faces are, the less similar one is to the other. Siamese Network is a type of neural network architecture used for tasks such as image recognition. Siamese Networks are designed to process two input instances and compare them to determine if they are the same or different.

Games feature includes games which helps in mental wellbeing of a user. we use JavaScript to the game engine's implementation. This might entail writing programmers to render images, process user input, and update the game's state. The game uses a game loop to update the state of the game and draw the game objects to the screen using HTML and CSS. The game also implements various game design patterns, such as the observer pattern, to manage game events and changes in game state.

Memory album feature can be a helpful way to organize and review your photos and videos, and to reminisce about past events we use Flask and MongoDB to add or display the memories of the user. By using flask, we will define the app features i.e., memory album, add the memory, to handle the routing and rendering of the user interface. The memory album application uses MongoDB as a backend database to store and retrieve data. To-do-list feature can be used as a memory aid, helping users to remember and prioritize tasks we use Flask and MongoDB to enter, retrieve or show the data.

By using flask, we will define the app features i.e., To do list, add the activity and remove the activity. MongoDB is the database where all the data entered by the user will be stored.

Diary feature functions similarly to a traditional diary that we use to record significant occasions and facts. In addition, this feature creates a summary of the relevant incident for the subsequent encounter with the same person. we use Flask and MongoDB to enter, retrieve or show the data.

Sections 2 to 6 of the paper are dedicated to various aspects of the research. Section 2 provides a detailed review of related work, while section 3 outlines the materials and methods employed. Section 4 delves into the proposed work and its intricacies, while section 5 presents the results obtained and offers a comprehensive discussion. Finally, section 6 presents concluding remarks on the study, along with suggestions for improving the features.

## II. RELATED WORK

In recent years, various interventions have been developed to help individuals with amnesia overcome these challenges and improve their social interactions. This section of the paper will review the related work that has been conducted in this area, including studies on memory rehabilitation, cognitive and behavioral therapies, and the use of technology-based interventions such as virtual reality and assistive technology. Additionally, we will discuss the effectiveness of these interventions and highlight areas for future research.

The authors of the paper, Gaurav Gupta, Ankit Gupta, Varun Jaiswal, Mohd Dilshad Ansari [1] has defined that the study shows that smartphones can have a positive impact on the quality of life and cognitive abilities of Alzheimer's patients. It examined over 60 mobile apps that are commonly used by Alzheimer's patients and found that the most useful features to be incorporated into these apps include: information about Alzheimer's, scheduling and refilling medication, daily activity scheduling, doctor questionnaires, news updates on Alzheimer's research and treatment, contacts for friends and family, music and games, and real-time patient tracking. The authors of the paper found that only five apps out of the 60 studied were found to be particularly useful, they are Carezone, Tweri Alzheimer Medical App, Alzheimer & Dementia, CURAAP, Alzheimer Assistant.

Aziz Presswala, Srushti Pathak, Gunjan Jhanwar, and Neha Katre[2] are the paper's authors, and they claim that the global prevalence of Alzheimer's disease and dementia, with an estimated 50 million people affected worldwide and 4 million in India alone. By 2050, it is projected that the number of people living with the disease will reach 131.5 million unless new prevention or cure methods are developed. To address this issue, the authors propose an android app called Neuromemorize. This app uses AI-based face recognition to help patients identify loved ones, live location tracking for caretakers to monitor patients' location, and reminders for daily activities and photo sharing to refresh memories and connect with family and friends. Some of the proven technologies are photo albums, reminders, location tracking, picture-based phonebook, music, and face recognition. Other useful apps for Alzheimer's patients and caretakers found by the authors include MindMate, It's Done, CareZone, Lumosity Mobile and Timeless.

The paper's authors, Libby Ferland, Ziwei Li, Shridhar Sukhani, Joan Zheng, Luyang Zhao, and Maria Gini[3], claim that the paper discusses the challenges and needs of patients with amnesic Mild Cognitive Impairment (MCI) and how intelligent assistant technology can aid in addressing them. The authors mention that successful technologies for memory loss patients generally fall into three categories: managing daily life, increasing patient engagement in activities and social life, and supporting professionals and systems involved in patient care. They propose to focus on developing a personal assistant that specializes in handling calendars and scheduling tasks. The pilot application is a scheduling assistant that syncs with various cloud-based calendar services and can interpret speech commands to add, delete or modify calendar events, and remind users of upcoming

events or set alarms. The challenges and shortcomings of this application include: native calendar support, voice activation, device storage and web hosting, privacy, and user adoption rates.

Kanwal Yousaf, Zahid Mehmood, Israr Ahmad Awan, Tanzila Saba, Riad Alharbey, Talal Qadah, and Mayda Abdullateef Alrige are the authors of the paper[4], and they express in their work that the comprehensive study of existing mHealth dementia apps and their effectiveness in assisting people with dementia, including Alzheimer's disease, and their caregivers. A literature search was conducted using six electronic databases, resulting in 2818 research articles, with 29 meeting the inclusion and exclusion criteria. The literature revealed six main groups of mHealth dementia apps: (1) cognitive training for daily activities, (2) monitoring for safety and health, (3) dementia screening, (4) reminiscence and socialization, (5) tracking, and (6) caregiver support. The first group includes apps for memory, language abilities, problem-solving, attention, and schedule and communication. The second group includes apps for monitoring safety and health, divided into sub-groups for safety monitoring, health monitoring, and activity monitoring. The third group includes apps for dementia detection and cognitive state screening. The fourth group includes an experimental study using the mHealth app InspireD, which organizes reunions and collects personalized and general memorabilia. The sixth group includes apps for dementia education and support.

Authors of the paper Kazi Shahrukh Omar, Afia Anjum, Tahrira Oannahary, Md. Rezaul Karim Rizvi, Diana Shahrin, Tasmiah Tamzid Anannya, Sanjida Nasreen Tumpa, Md. Mahboob Karim, Muhammad Nazrul Islam, and Md. Fazle Rabbi[5] state their work as an intelligent assistive tool that aims to help individuals with Alzheimer's disease with daily tasks and improve their quality of life. The tool is designed as a framework that consists of four modules: heart rate monitoring, lost item finder, smart medicine box, and lost patient locator. All these functionalities can be accessed through a single mobile application that can be used by the patient's caregiver or nurse. The system uses a rule-based expert system which is able to understand natural language input and provide appropriate responses. This research contributes to the field of assistive technology for Alzheimer's patients by integrating several features into a single system and by developing a mobile application that allows for easy access to these features from a single platform. The proposed system provides an integrated round-the-clock service to patients both in the home and outdoor. However, it should be noted that the system was built as a prototype and was developed in an academic environment and thus, no evaluation study with real-users has been obtained against it. Additionally, the smart medicine box module does not work without a Wifi connection and does not have a face recognition module.

The paper's authors—Nahla Aljojo, Reem Alotaibi, Basma Alharbi, Areej Alshutayri, Amani Tariq Jamal, Ameen Banjar, Mashael Khayyat, Azida Zainol, Abrar Alroqy, Rahaf Almagrabi, Taghreed Khalawi, and Sarah Alharthi [6] express it as :The Alzheimer Assistant is an application developed to help Alzheimer's patients by identifying people through a classified album on the application, along

with displaying information about their relationship. The application also sends notifications to remind patients of their daily tasks and provides them with a tracking bracelet to establish their location in case of getting lost. This application aims to improve the confidence of Alzheimer's patients in participating in everyday activities, thus improving their ability to engage in social events on a daily basis. It also provides assistance to caregivers and families of Alzheimer's patients. However, the limitation of this application is the lack of a facility for remote monitoring by caregivers. Future work will focus on incorporating remote monitoring feature and face recognition through deep learning algorithms to improve the functionality of the application and it will be officially endorsed by the Alzheimer's Patients Association in Saudi Arabia. This application builds on the existing software solutions to support those with Alzheimer's in participating in social activities with their family and friends. It highlights the benefits of adopting advanced technologies, such as face recognition, in addressing the challenges associated with this condition in society today.

Zainab Khan, Amirita Dewani, and Hira Mustafa, the authors of the paper[7], claim that Alzheimer's Disease (AD) progresses, patients become increasingly reliant on caregivers, making life difficult for both the patient and the caregiver. To address this issue, we developed an Artificial Intelligence (AI) based Android application that includes various AI and non-AI based features to assist both the patient and the caregiver. The features include face recognition, a chatbot, voice navigation, location tracking, and pill reminders, which are designed to assist individuals with Alzheimer's Disease in their daily tasks, such as communication, location tracking, medicine reminders, memory boosting games, and recognizing people. The goal of this project is to not only benefit AD patients, but also to provide comfort for caregivers by assisting and managing their loved ones with the use of a convenient device like a mobile phone and the benefits of modern Artificial Intelligence. Additionally, the application can also include a feature that suggests music options based on the patient's mood for additional engagement and enjoyment, storing patient's medical history for consulting different doctors and in case of a change in caregivers. The application can be expanded to target more platforms like iOS and web to provide more accessibility and reach a larger audience. The aim of paper is to bring ease and change in the lives of the targeted audience and help them manage the effects of this debilitating disease.

Shooq Alharbi, Aisha Altamimi, Fadwa Al-Qahtani, Bashair Aljofi, Mutasem K. Alsmadi, Muneerah Alshabanah, Daniah Alrajhi, and Ibrahim Almarashdeh are the authors of the study[8]. They claim that the proposed system aims to assist individuals with Alzheimer's Disease by providing them with a way to remember important tasks that can help them live independently and potentially slow the progression of the disease. The use of technology allows for consistent and reliable care, as it is not susceptible to forgetfulness or damage. The system includes features such as reminders for family members, memories and family photos, information, medication reminders including dosage and schedule, and hospital appointments. However, the limitation of this proposed system is that it does not include any artificial intelli-

gence techniques. Additionally, it does not have a game module or a face recognition module, which could potentially provide additional engagement and assistance for patients.

Masakazu Iwamura, Kai Kunze, Yuya Kato, Yuzuko Utsumi, and Koichi Kis developed the system discussed in paper [9], highlighting its ability for automatic database indexing that's adaptable to varying sizes. The study introduces a practical method for a memory assistance system, emphasizing the identification of individuals. This memory enhancement system leverages wearable computing's potential as a significant application. Key attributes of this system include automatic segmentation and indexing of individuals encountered by the user without manual input. It utilizes scalable face recognition technology, addresses potential misidentifications, and presents multiple video options for accurate recognition. During the indexing phase, the system tracks detected faces across frames until a lapse occurs. This continuous sequence is then recognized as a video, indexed with specific local features from each frame's facial area. To truly assess its effectiveness, real-world application testing remains the most appropriate evaluation method.

According to a study by Sergiu Jecan, Lucia Rusu, Ralph Arba, and Daniel Mican [10], a mobile application designed for daily tasks, patient monitoring, and disease surveillance was initially created for individuals with amnesia, specifically targeting the elderly with cognitive issues. Mild Cognitive Impairment signifies an above-average cognitive decline in the elderly, potentially progressing to Alzheimer's disease. Within the realm of Ambient Assistive Living, mobile health technologies support remote patient supervision, mobility assessments, and fall detection. Gerontechnology, merging gerontology with technology, focuses on enhancing elderly people's quality of life through technological interventions. This research introduces a gerontechnological mobile solution that bolsters or retains cognitive abilities and manages physical activities via a customized game based on an individual's reactions within the AAL platform named Mobile@Old. Mobile@Old integrates various stakeholders like doctors, caregivers, and elders to enhance well-being, combat isolation, refine living conditions, and track health metrics. The platform comprises three parts: the primary web component Mobile@Old, MR@Old for mobile monitoring of the elderly, and O@Exergame to stimulate physical and cognitive engagement. The MR@Old component serves seniors interested in using wearables to oversee health and address cognitive challenges. Integrated within the Mobile@Old web platform, MR@Old collaborates with other modules, such as Med for vital parameter monitoring, Rem for cognitive aging reminders, VSM for behavior-based activity assessments, and PAT for suggesting additional physical activities or exergames when identifying reduced activity levels.

The paper's authors, namely Noraziah ChePa, Laura Lim Sie-Yi, and Sumayyah Adetunmbi[11], state that the technology use through digital games has become one of the alternative interventions for memory impairment. It can be viewed as a complementary tool to conventional therapies compared to pharmacological treatments, which are not only expensive but also have significant side effects. This article proposes guidelines and standards to help design and develop

psychotherapy games that can be used to treat memory impaired patients. A major contribution of this research is the standards and guidelines for psychotherapy games, which will benefit game developers and practitioners directly involved in psychotherapy programs for patients with memory impairment. Electronic games have become one of the alternative interventions that can be considered as a complementary tool to traditional treatment methods.

Prachi Navale, Snehal Marne, Ritika Gupta, Neha Bhavsar, and Tejasvita Vaidya are the authors of the study [12], and they claim in their work that an amnesia monitoring programme called Amnecare that sends drug reminders, daily schedules with reminders, and locates the patient using real-time GPS tracking to ensure its safety. The major objective is to encourage smartphone use among amnesiacs in order to increase their self-assurance and assist them in leading independent lives. By offering facial and speech recognition powered by artificial intelligence to stay connected, this application intends to assist the patient. By offering face recognition capabilities, this programme assists the patient in identifying the individual and their link to them in such circumstances. A video camera at the door for the patient's protection and pill voice alarms to make sure they are reminded to take their prescription.

The research previously conducted in this area provided the impetus to move forward with the development of the system, which is thoroughly explained in the "Materials and Methods" section.

### III. MATERIALS AND METHODS

Memory Assistance projects are designed to help individuals with memory-related issues to manage their daily tasks and activities. These projects include various tools and applications:

- **Generating the Module:** In this step the modules are implemented using various tools and software.
- **Hosting the Website:** All the modules are collectively added to a website.

#### A. *Generating the Module:*

To generate a module, we use various tools and networks. The important task is to make different modules with different features which help the amnesia patients. The Generating Module is further divided into five sub modules. They are:

##### ➤ *Face Recognition module:*

Face recognition using Siamese networks for amnesia patients involves the use of deep learning models to assist individuals with memory loss in recognizing familiar faces. This module aims to evaluate the effectiveness of using Siamese neural networks in facial recognition tasks for amnesia patients. It involves four main components:

- **Add Face:**

We used Flask and MongoDB to add or upload photos and details of people.

The steps involved are:

- ✓ Add the person into the database by using the feature add the person.
- ✓ Upload the photos and relative details of the person.
- **Recognize the person:**
  - Face recognition module is made up of two sub-models:
    - ✓ Face Detection.
    - ✓ Face Recognition.

##### ❖ **Face Detection by OpenCV Haar Cascade:**

For face detection, we utilized face detection from the OpenCV Haar Cascade. OpenCV Face Haar Cascade is a computer vision and machine learning algorithm used for face detection in images. It is based on the Haar cascade algorithm, which is a type of object detection algorithm commonly used in computer vision and image processing.

##### ❖ **Face Recognition by Siamese Network:**

For face recognition, we built a Siamese network to identify the dissimilarity of the faces. The more similar two faces are, the less similar one is to the other. Siamese Networks are often used for face recognition tasks, as they are well-suited to the problem of determining whether two faces are the same or not.

##### ❖ **Training of Siamese Network:**

To train the network, the wild face dataset to create the dataset. The dataset is created by randomly generating two pairs of images and labels indicating whether they are the same or different. In a face recognition system, a Siamese Network is trained on a set of face images, where each image is paired with a label indicating the identity of the person in the image. During training, the two sub-networks in the Siamese Network process the two images in each pair and compare their features to determine if they are the same or different. Figure 1 and Figure 2 shows the architecture of siamese network.

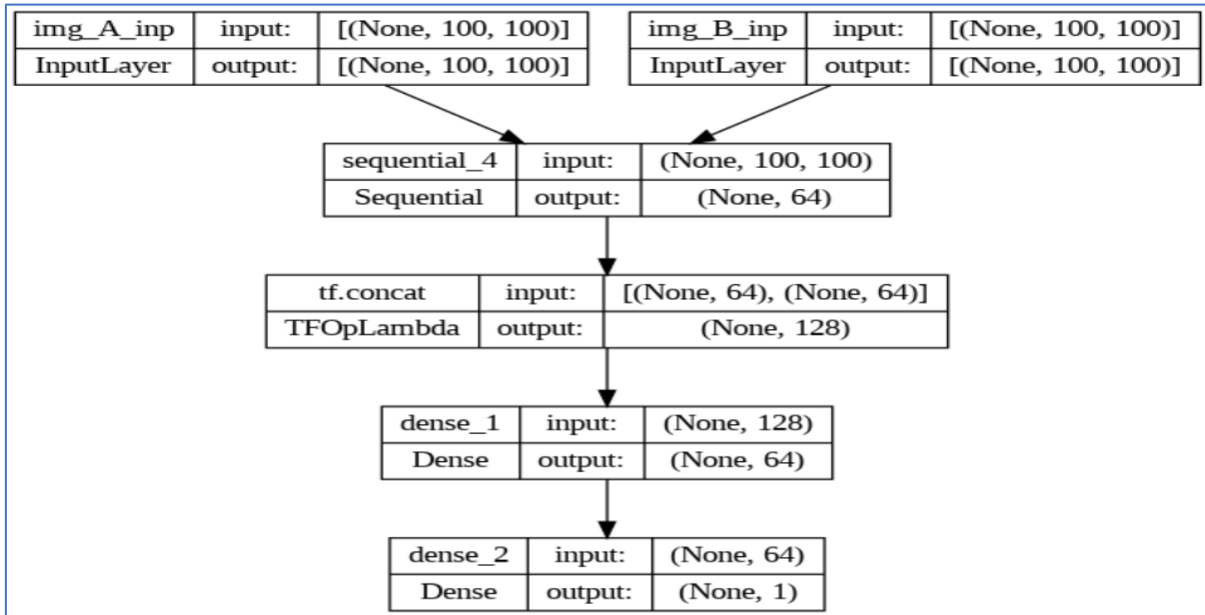


Fig. 1: Siamese Network Architecture

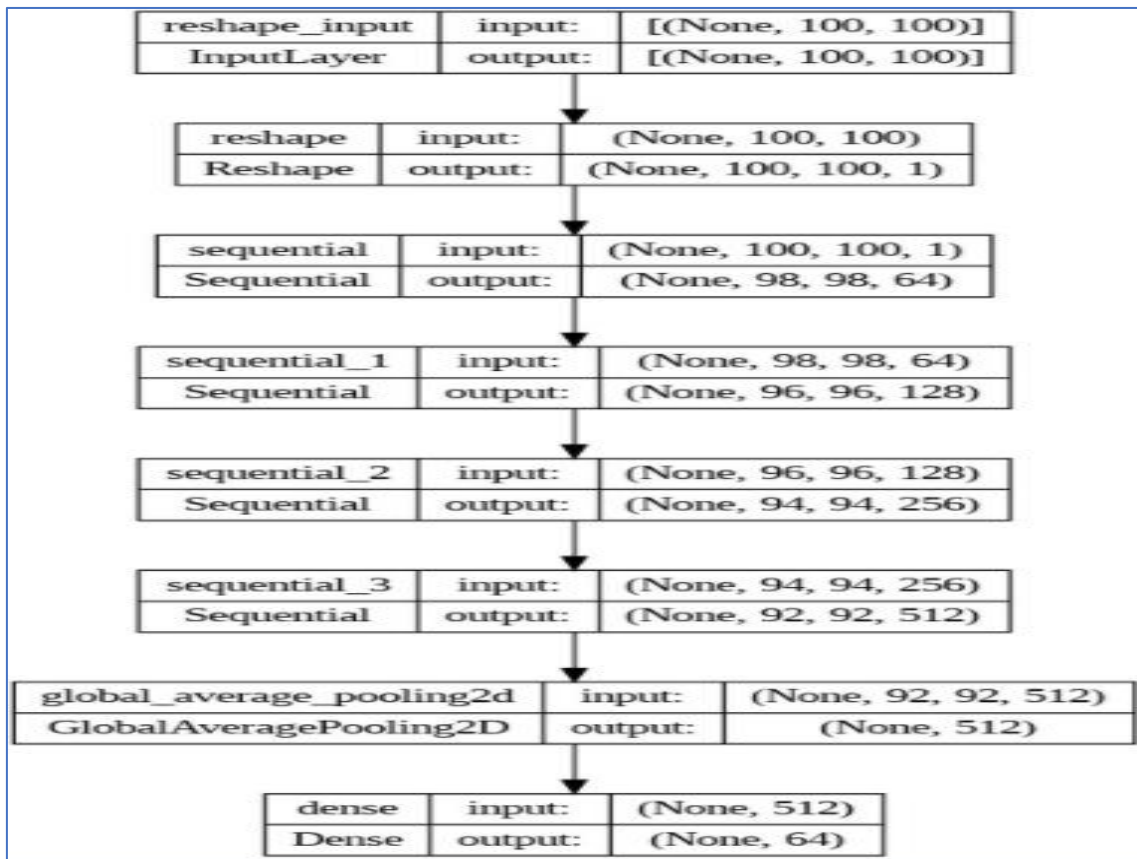


Fig. 2: Detail Information about what happens between input and sequential 4 layer

❖ Use of Siamese Network on the website:

Before sending a new image to the model, It crops the face that is detected by the face detection model. It retrieves all the images that are relatives to the user and then compare the similarity between each image from the database to the image (that needed to be predicted). Once it checks against all the images, it gets dissimilarity of all relatives of users. Then it finds the minimum one from the list and check whether it is below 0.5 if it so it recognizes the person as the same person in the relative image.

Note: We used pre-trained OpenCV Face Haar Cascade for face detection, which can be used to detect faces in new images. The algorithm slides a window across the image and evaluates the features inside the window to determine if they match the features of a face. If the features match, the algorithm considers the window to contain a face and draws a rectangle around it.

### ➤ *Game module*

In this module, our aim is to design and develop a games module for individuals with amnesia. To accomplish this goal, we utilized JavaScript as the primary programming language to implement the game engine. Specifically, we wrote programmes to following steps:

- Rendering the images.
- Process user input.
- Update the game's state.

Java Script classes and objects are also used to define the characteristics and actions of the game objects.

Furthermore, the game mechanics are defined, including the appearance of the objects and the rules for scoring and time limits, in JavaScript code. The game loop was implemented to update the state of the game and draw the game objects to the screen using HTML and CSS. To manage game events and changes in game state, we also implemented various game design patterns, such as the observer pattern.

Overall, our approach involved a comprehensive use of JavaScript and game design principles to develop an engaging and user-friendly game module for individuals with amnesia. The game module was designed to be easily accessible by users. It involves in the following steps:

- ✓ User needs to click on the game which he/she would like to play.
- ✓ The game page will be opened, and the user can start playing the game.

This study will provide valuable insights into the development of games modules for individuals with amnesia and contribute to the growing body of literature on the use of technology in healthcare.

### ➤ *Memory album*

In this module, our aim is to develop a memory album application using Flask and MongoDB. It contains the following features:

- To add and store the user's memories.
- To display the user's memories.

Flask was used to define the application's features, including the memory album and the option to add memories, as well as to handle the routing and rendering of the user interface. MongoDB was used as the backend database to store all the data entered by the user, such as the title, date, and location of each memory.

Additionally, various web development techniques, such as templates and forms, were employed to simplify the development process and create a user-friendly interface for the application.

The memory album application was developed using JavaScript, HTML, and CSS to create a dynamic user interface. MongoDB was used to store the data in a NoSQL database, while Flask was used as the web framework for the application. The development process involved designing the database schema and defining the routes for the application. Additionally, various web development libraries were uti-

lized, such as Flask-WTF for form handling and Flask-Login for user authentication.

The application was tested using various scenarios, such as adding, retrieving, and deleting memories from the album. The user interface was evaluated for ease of use and overall usability. The data collected from the application was analyzed using statistical methods, such as descriptive statistics, to gain insights into the user's behavior and preferences when using the memory album application.

- ✓ To add and store the user's memories:

To add a memory to the album, the following steps are involved:

- The user had to click on the "add memory" option.
- After clicking the option user can post the memory, which was then stored in the database.

- ✓ To display the user's memories:

To display the memory of the user. The following process is involved:

- User needs to click on the "Album" option.
- The data stored in the database will be retrieved and displayed to the user.

In conclusion, the memory album application developed in this study used Flask and MongoDB to store and display the user's memories. The application demonstrated the use of various web development techniques and libraries to create a user-friendly interface. The application can be used as a basis for further research into the use of technology to support memory recall in patients with memory impairments.

### ➤ *To-dolist3*

For the development of the To do list feature, Flask and MongoDB were utilized to perform the following tasks:

- To enter the activities.
- To retrieve and show the activities.
- To delete the activity.

Flask was used to define the app features such as the To do list, add the activity, and remove the activity, and to handle the routing and rendering of the user interface. On the other hand, MongoDB served as the backend database where all the data entered by the user will be stored.

Various web development techniques such as templates and forms were used to simplify the development process and create a user-friendly interface. The To do list feature provides users with a convenient and accessible way to manage their tasks and activities.

- ✓ To enter the activities:

The following process is involved to enter the activities:

- ❖ To add the task to the list the user needs to click on the "Add the Activity" feature.
- ❖ After clicking on it user can enter the task, which will be stored in the database.

- ✓ To retrieve and show the activities:  
The process involved is:
  - ❖ User needs to click on “To-dolist” feature.
  - ❖ After clicking on the feature the data will be retrieved from the database and will be shown to the user.
- ✓ To delete the activity:  
The steps involved are:
  - ❖ To delete the activity user needs to click on “Remove the Activity”.
  - ❖ After clicking on the feature the task will be deleted from the database.

➤ *Diary application:*

The diary application is developed using Flask and MongoDB technologies. The application involves following features:

- To Add the diary entry.
- To retrieve and show the diary entry.
- To Remove the diary entry.

The diary application's materials and methods involve the use of Flask and MongoDB technologies for application development, database management, and user interface design. The application's features and functions are defined using Flask, while MongoDB stores all the data entered by the user. The application also incorporates web development techniques, such as templates and forms, to enhance the user experience.

- ✓ To Add the diary entry:  
The following steps are involved to add the entry:
  - ❖ User needs to click on the “Add the Diary Entry” feature.
  - ❖ After clicking on the feature user can add the entry, which will be stored in the database.
- ✓ To retrieve and show the diary entry:

- The steps involved are:
- ❖ User needs to click on the “Diary” feature.
  - ❖ After clicking on the feature the data will be retrieved from the database and will be shown to the user.
- ✓ To Remove the diary entry:  
The process involved are:
- ❖ User needs to click on “Remove the entry” feature.
  - ❖ After clicking on the feature the task will be deleted from the database.

B. *Hosting a website:*

For hosting the website, Amazon Web Services (<https://aws.amazon.com/>), a cloud service provider is used.

Steps to be followed:

- Go to Services and search for elastic beanstalk.
- Click create application and name the app and select the platform.
- Upload zip folder of the app in Application code and click create application.
- Copy the url from elastic beanstalk->Environments.
- Paste the url in the browser to check whether it is working.

The section outlining the proposed system describes the utilization of materials and methods to create a system known as "Memory Assistance".

**IV. THE PROPOSED SYSTEM**

The proposed system is a Memory Assistance project that includes various tools and applications to help individuals with memory-related issues manage their daily tasks and activities. The system comprises five modules: Face Recognition, Games, To-do lists, Diary, and Memory Album. Figure 3 shows the overall architecture of the system.

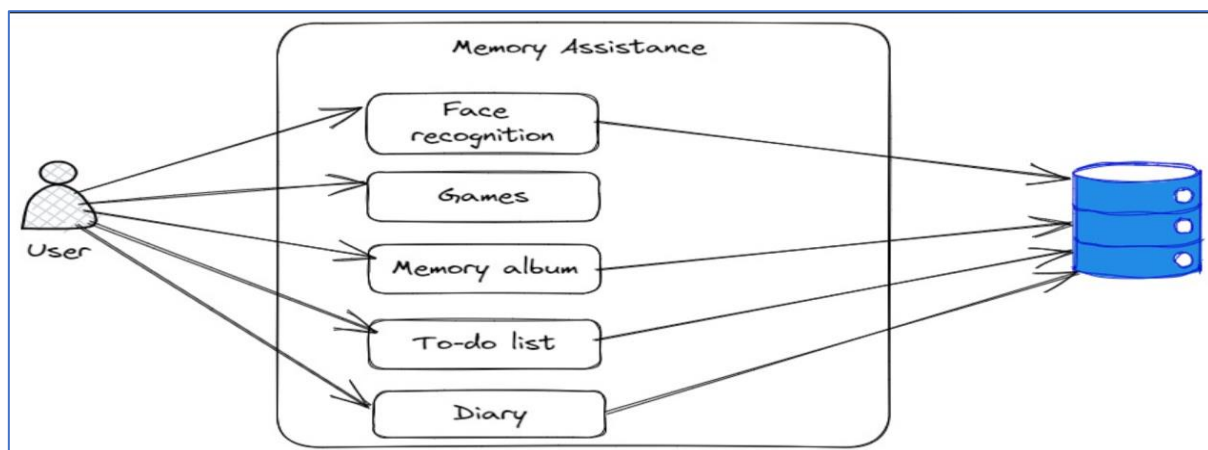


Fig. 3: Overall Architecture of the Project.

The Face Recognition module is designed to assist individuals with amnesia in recognizing familiar faces. The system uses deep learning models, specifically Siamese neural networks, to recognize faces. The module has two sub-models: face detection using OpenCV Haar Cascade and face recognition using a Siamese network. The system allows users to add or upload photos and details of people to the backend database using Flask and MongoDB. To recognize a

person, the system crops the face detected by the face detection model, retrieves all the images that are relatives to the user, and compares the similarity between each image from the database to the image that needs to be predicted. Once the system checks against all the images, it recognizes the person as the same person in the relative image if the dissimilarity is below 0.5.

The Game module is designed to provide an engaging and user-friendly game module for individuals with amnesia. The system uses JavaScript as the primary programming language to implement the game engine. The game mechanics, including the appearance of the objects and the rules for scoring and time limits, are defined in JavaScript code. The system implements various game design patterns, such as the observer pattern, to manage game events and changes in game state. The game module is easily accessible by users, who can simply click on the game and open the game page to begin playing.

The Memory Album module is designed to store and display the user's memories. The system uses Flask and MongoDB to define the application's features, including the memory album and the option to add memories, as well as to handle the routing and rendering of the user interface. MongoDB is used as the backend database to store all the data entered by the user, such as the title, date, and location of each memory. To retrieve the memories, the application randomly retrieves the memories from the database and displays them on the user interface.

The proposed methodology for the development of the To do list feature involves the utilization of Flask and MongoDB to enter, retrieve and delete the activities. Flask is used to define the app features such as the To do list, add the activity, and remove the activity. To enter the activities, the user needs to click on the "Add the Activity" feature and enter the task, which will be stored in the database. To retrieve and show the activities, the user needs to click on the "To-do list" feature, and the data will be retrieved from the database and shown to the user. To delete the activity, the user needs to click on "Remove the Activity" and the task will be deleted from the database.

The proposed methodology for the development of the diary application involves the use of Flask and MongoDB technologies. The application includes three features: adding a diary entry, retrieving and showing a diary entry, and removing a diary entry. To add an entry, the user needs to click on the "Add the Diary Entry" feature and enter the diary entry, which will be stored in the database. To retrieve and show the diary entry, the user needs to click on the "Diary" feature, and the data will be retrieved from the database and displayed to the user. To remove a diary entry, the user needs to click on the "Remove the entry" feature, and the entry will be deleted from the database.

The proposed system has several benefits. First, it helps individuals with memory-related issues manage their daily tasks and activities. Second, it uses advanced technologies, such as deep learning models and game design patterns, to provide an engaging and user-friendly experience for the users. Third, it uses Flask and MongoDB to handle the backend, which allows for easy scalability and maintenance of the system. Fourth, the system provides valuable insights into the development of memory assistance projects for individuals with amnesia.

However, the proposed system has some limitations. The Face Recognition module may not be accurate in recognizing faces, especially if the photos are of poor quality or if the individuals have changed their appearance significantly. The Game module may not be suitable for all individuals with amnesia, as some may not be interested in playing games. The Memory Album module may not be useful for individuals who do not have any memories they wish to store or display.

In conclusion, the proposed system is a Memory Assistance project that includes five modules: Face Recognition, Game, Memory Album, To-do List, Diary. The system is designed to help individuals with memory-related issues manage their daily tasks and activities using advanced technologies such as deep learning models and game design patterns. The system provides valuable insights into the development of memory assistance projects for individuals with amnesia, and it has several benefits, including its user-friendly interface, easy scalability, and maintenance. However, the system has some limitations, and further research is needed to improve the accuracy of the Face Recognition module and to develop alternative modules for individuals who may not be interested in playing games or storing memories.

The experimental results and discussions section clearly presents the outcomes of this proposed system, accompanied by screenshots of the final output.

## V. EXPERIMENTAL RESULTS AND DISCUSSIONS

The outcome of the proposed work is a cloud-hosted website that contains all the features, making them easily accessible to users. Figure 4 displays performs of Siamese network and other networks like facenet, resnet, vggnet for face recognition task.



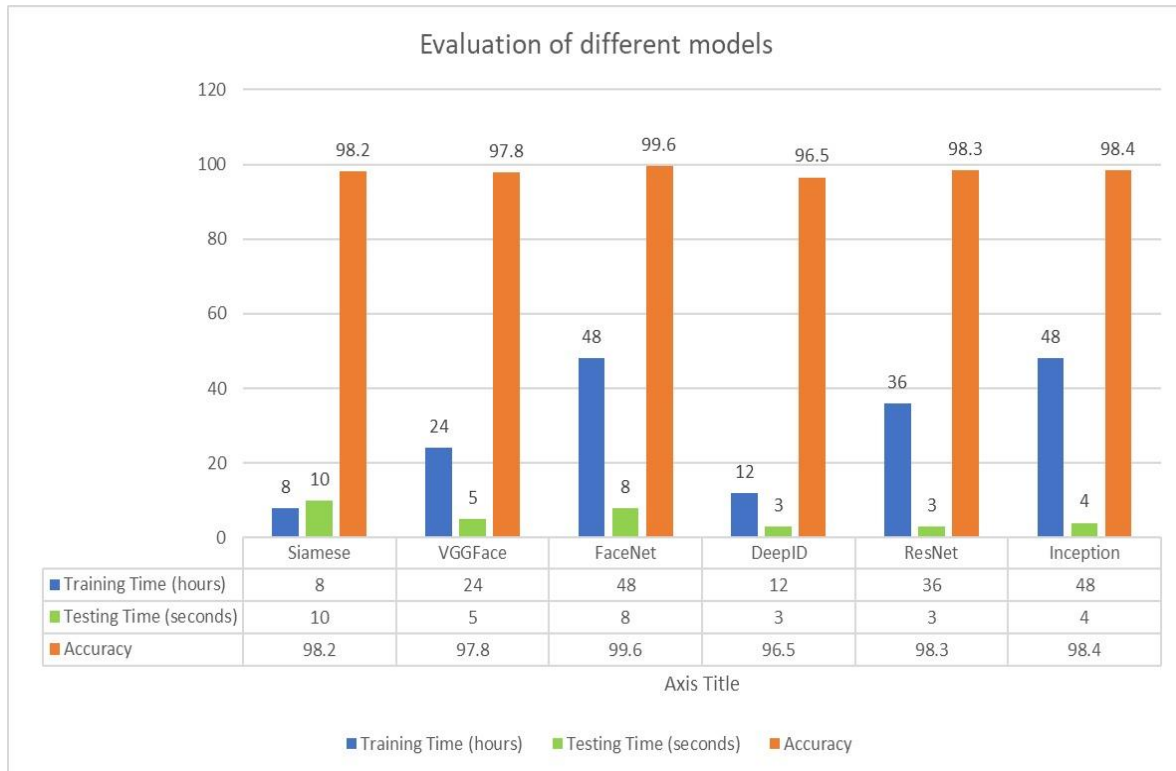


Fig. 4: Shows performance comparison of Siamese network against all cnn networks

In figure 4 we find that training time of the network is relatively less than others and accuracy is much better expected the testing time. The reason for high test time is comparison of high number of images in the databases.

Figure 7 displays images of the website. The website has different sections for different features. Users can easily

navigate to their preferred features and access the features. The Face recognize features it has accuracy of 98% finds similarity and we made the user friendly website so that anemisa patients can easily access it. Figure 5 shows adding of new persons to website and Figure 6 shows recognise of the person.

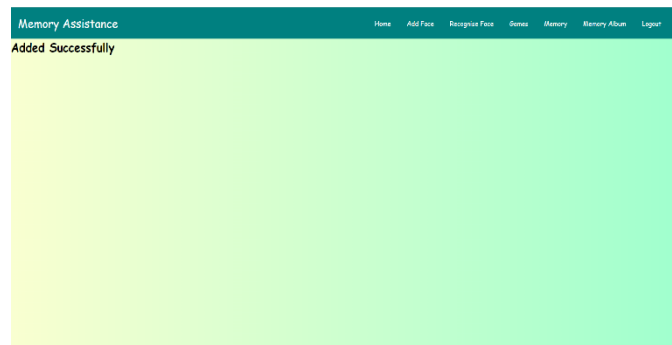
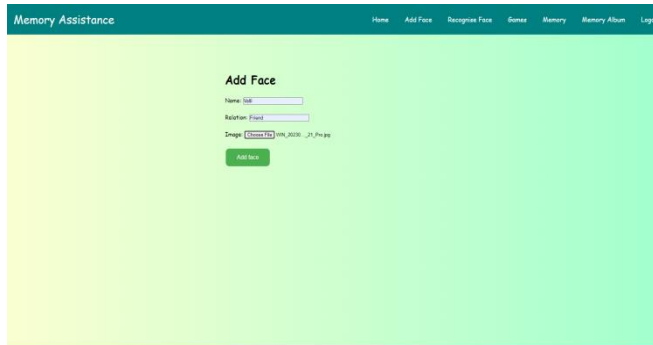


Fig. 5: Adding of the new person into the website

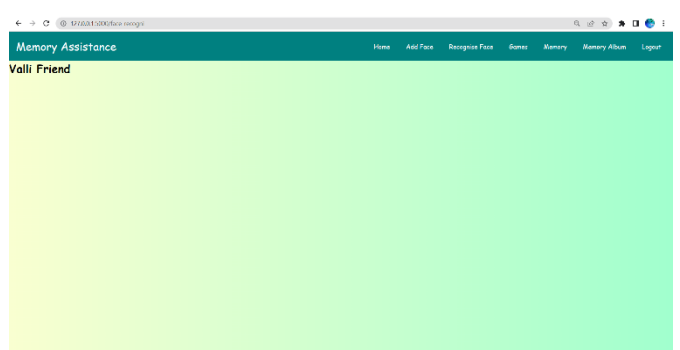
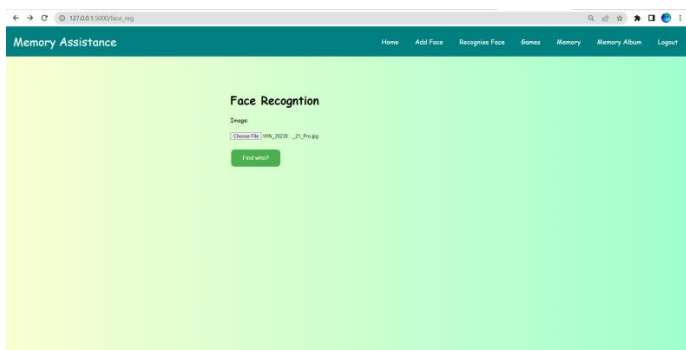


Fig. 6: Recognising the person using the website

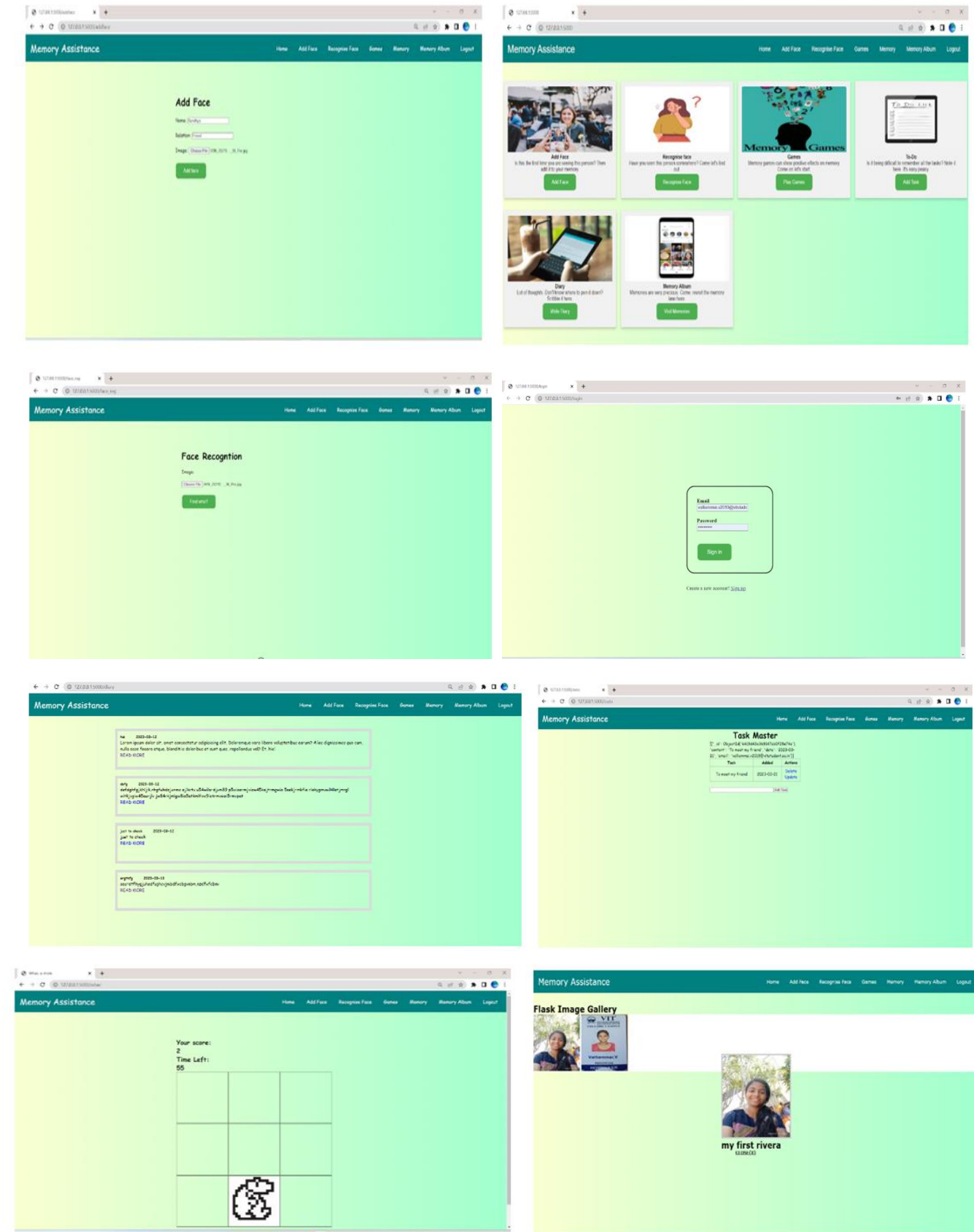


Fig. 7: Overall Website view.

The Memory Assistance system was developed with the goal of being user-friendly, so that users can easily access all of its features. The system includes the Add Face and Recognize Face features, which can help individuals with memory

loss to remember and identify people they know, leading to improved social interactions and reduced social isolation. The Todo List feature can aid those with memory impairments in keeping track of important tasks and appointments,

leading to improved productivity and quality of life. The Memory Album feature can assist individuals with memory loss in recalling significant life events and important people, improving their sense of identity and social connectedness. The Diary feature can help individuals with memory impairments in documenting their daily activities and experiences, leading to improved mood and sense of accomplishment. Games can provide cognitive stimulation and entertainment for individuals with memory loss, improving their cognitive function and overall quality of life. However, the effectiveness of these features may differ depending on the severity and cause of an individual's memory impairment, as well as their personal preferences and abilities.

Above, the proposed work and its results have been discussed, while the "Conclusion" section outlines potential future research directions in this field.

## VI. CONCLUSION AND FUTURE WORK

In conclusion, the use of technology to aid people with Amnesia has the potential to greatly enhance their quality of life. The proposed solution not only provides assistance in day-to-day activities, but also stimulates the brain through the use of games and exercises. While further research is necessary to refine and improve the proposed system, this study demonstrates the feasibility and effectiveness of incorporating technology to assist individuals with Amnesia. Overall, the integration of technology has the potential to revolutionize the way we approach care for individuals with memory impairments, ultimately leading to greater independence and well-being.

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