IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Vol. 10, Issue 4, April 2021

DOI 10.17148/IJARCCE.2021.10429

DIGITAL SIGNAGE (MOBILE APPLICATION FOR DEMENTIA)

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ABSTRACT: The aim of the paper is to focus on important aspect of the Diseases which is affecting a Huge Amount of Population today i.e Dementia and building an Android application that could ease the everyday life of a person affected by Dementia disease. It is hoped that this research will analyze that specially created apps and existing assistive software can be used to decrease the symptoms and improve cognition of adults suffering from dementia related diseases. It addresses the problem of increased dependency of Dementia patients on caregivers and helping them in a Techie way as each person on Earth owns a Mobile Phone specially if you consider India as India is ranking among top countries wherein its population is suffering from this disease.

Keywords: Dementia, Mobile Phone, Caregivers.

1. INTRODUCTION

In 2016, there were 47 million people living with dementia worldwide. With ageing populations across the world, this number is estimated to rise to 131 million by 2050. Not only does it have a significant impact on the people living with dementia, their families and the wider society; but it also has a huge economic impact. In addition, most people with dementia remain undiagnosed and are therefore unable to access care and treatment. When dementia is diagnosed and care services exist, they often are patchy, fragmented, inaccessible, expensive and not suited to meet the needs of people suffering from dementia or their families. This not only leads to increased suffering for people with dementia and their carer's, as well as impacting significantly on the finances of the family through indirect costs of illness and loss of productivity.

As we can know the Alzheimer patients have short term memory so they face some common day to day problems like wandering off, forgetting their diet , forget faces/names of family members are the most common one. Some of the big problem that they may face is they forget the important data like their address and doctors treating them etc. To solve all this problem Alzheimer patient's have to keep a caretaker with them. But in today's IT World what if there is an application which will take care of the patient instead of the Human care-taker, which helps the patient to remember faces/names of family members, gives reminder to have medicine, helps them to follow full schedule, etc. It also helps the patients to work on their Mental Ability and estimate his/ her progress by progress report which will be generated by playing games. Solving problem games which will help him/her to stimulate brain functioning.

While selecting the topic for our project the one thing we had in our mind was that the proposed system should be benefitting people. Our objective was to make an individual suffering from this disease as independent as possible.

2. DEMENTIA

Dementia is a syndrome characterized by disturbance of multiple brain functions, including memory, thinking, orientation, comprehension, calculation, learning capacity, language, and judgement. The impairments of cognitive function are commonly accompanied, and occasionally preceded, by deterioration in emotional control, social behaviour, or motivation. Dementia can affect a person in different ways, and progression of the disease depends upon the impact of the disease itself and the person's personality and state of health. Dementia is a general term for loss of memory, language, problem-solving and other thinking abilities that are severe enough to interfere with daily life. Alzheimer's is the most common cause of dementia.

The table below defines the seven stages in dementia:

STAGES	SYMPTOMS	TIME PERIOD
Stage 1: No Cognitive Decline	No symptoms	Unknown
Stage 2: Very Mild Cognitive Decline	Typical age - related memory problems	Average duration of this stage is between 1 year and 2 years.

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Stage 3: Mild Cognitive Decline	Alzheimer's disease symptoms can become more noticeable to friends and family.	Average duration of this stage is between 2 years and 7 years.
Stage 4: Moderate Cognitive Decline	Symptoms of cognitive decline are apparent, and your loved one should be consulting with a health care professional.	Average duration of this stage is 2 years.
Stage 5: Moderately Severe Cognitive Decline	Memory loss of personal details. They may require caretaker or to move to a memory care community.	Average duration of this stage is 1.5 years.
Stage 6: Severe Cognitive Decline	One requires help for Activities of Daily Living (ADLs), such as bathing, toileting, or eating.	Average duration of this stage is 2.5 years
Stage 7: Very Severe Cognitive Decline	One may experience severe motor and communication impairment, and may lose the ability to speak or walk.	Average duration of this stage is 1.5 to 2.5 years.

Table 1: Stages of Dementia.

3. EXISTING SYSTEM

Below are three existing android applications :

A. Dementia Daily Companion

Features

- Free and immediate advice and tips for dealing with dementia behaviours and situation.
- Access to free dementias caregiver resources and training materials.

Drawbacks

- It does not provide GPS tracking or any other mechanism to solve the wandering problem of the patient.
- It does not provides independence to the Patient and always requires a Care Taker to keep a track thus useless.

B. Dementia Caregiver Buddy

Features

- Get instant help and advice.
- Provides the Caregiver an Idea about how to deal with wandering, bathing and meals i.e how to interface with Patient.

Drawbacks

- It is again not Patient oriented.
- It doesn't provides Location information to the patient.

C. Tell My Geo

Features

- Provides the Patient Location to its Relative.
- Stores the Medical Information of the Patient.

Drawbacks

- It doesn't provides Notification of to do list.
- It doesn't gives Information related to its Family Members.

4. DIGITAL SIGNAGE

Drawbacks of the existing system is that there are different apps for different features. It might get difficult to for the patient and caretaker to install and maintain these applications. Taking it into consideration the proposed system "Digital

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Signage" comprises of all the features required for a dementia patient upto Stage 5 into a single application. Depending on the stages we have developed two applications i.e

A. Dementia app for Patients.

Modules consists of:

- Signup and Login.
- Personal Information about Patient like name, address, email, birthdate.
- Details about family members and friends.
- Quiz game regarding identifying family members and friends.
- Reminder notification for taking medicines and performing exercises.
- GPS tracking and sending coordinates to caretaker.

B. Dementia app for Caretakers.

Modules consists of:

- Signup and Login.
- Information about patient.
- Input of pills and exercise reminder to be sent to patient.
- Tracking of patient's location.

This app can provide assistance for up to Stage 5 of dementia as the patient still is conscience of what he/she is doing in their day to day life. People affected with dementia disease suffers from various problems such as inability to think, communicate, and make sound decision, recall memory. They lose the track of what they are thinking and not know what to speak. Communication challenges are common in such patients. Behavioural symptoms such as depression, anxiety, sleep disorder also occurs as disease progresses. Changes in mood and personality, less social participation, distress from work all these symptoms drastically affect their livings. Therefore, to overcome above problems to some extent, Alzheimer care system is introduced which helps to keep track of the progress of the patients remaining capabilities and improving their overall quality of life. The focus of our work is to improve patient's condition through Android application which assist in their activities of daily living.

5. PROPOSED ARCHITECTURE BENEFITS

Our app aims to provide following functionalities:

- Dementia Care System helps the patient to remember faces/names of family members.
- Constant support of caretaker and health care professional is required so to put fewer burden on caretaker, without being physically present the caretaker can remind the patient to take medicines and perform exercises at just one click .
- If Patient goes out of home for some activity so to track the patient and help patient in their activities, the application tracks location of patient through Mobile based GPS.
- It also helps the patient's mental condition by improving his/her cognitive functioning by playing games.
- Patient often wanders off so to increase confidence in patient by boosting their memory.

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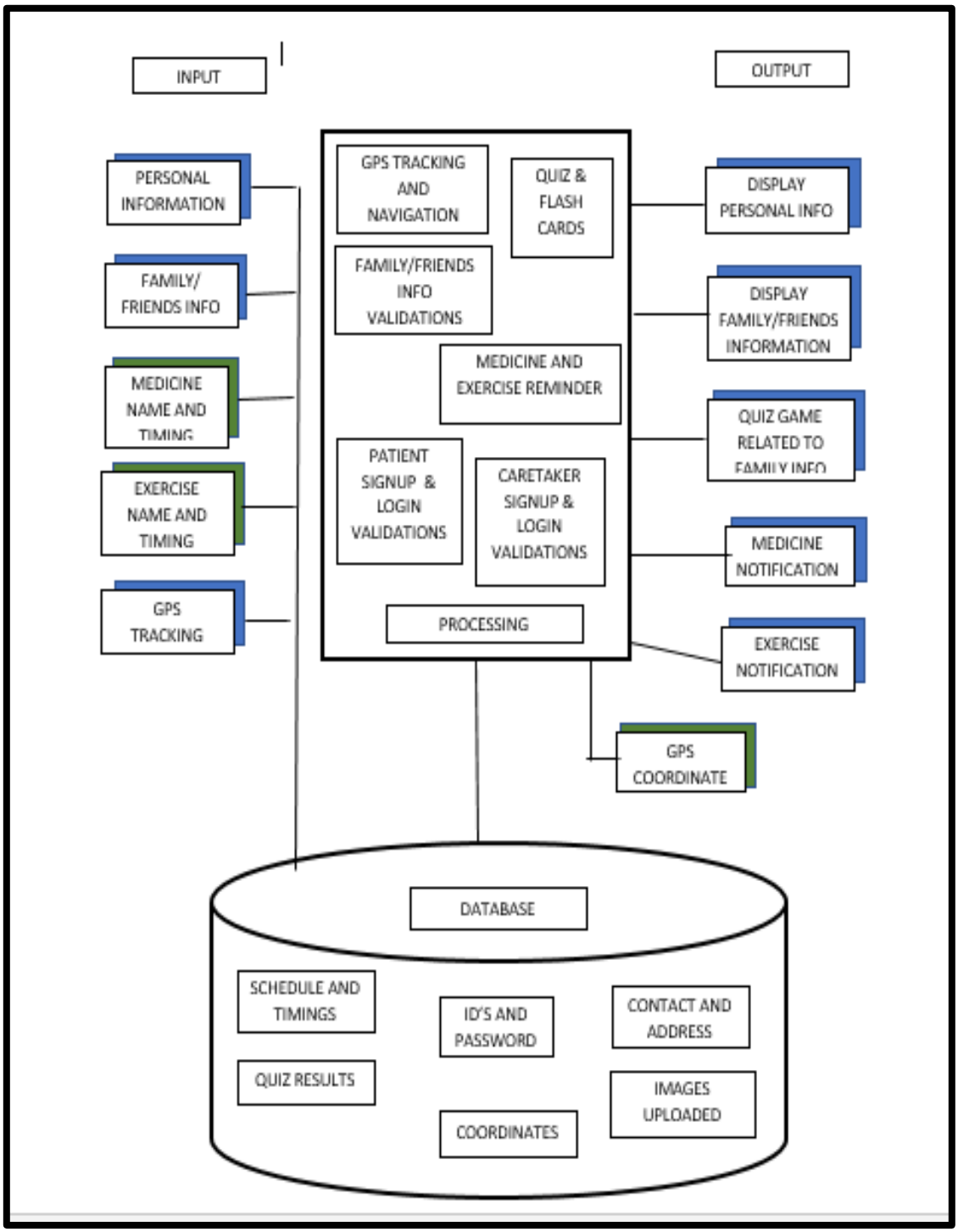

Fig: Proposed Architecture

The Proposed Architecture above consists of the following modules and their functions:

Module 1: Input

- The input module consists of inputs from both the applications differentiated by the color : input from patient's app is highlighted in blue and that from the caretaker's app is highlighted in green.
- Patient will provide with the input of his/her personal details, information about family members and friends and lastly GPS tracking.
- Caretaker's input consists of the medicine and exercise names and timings.

Module 2: Processor

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➢ The function of the processor is to process various functions and provide output. In our project, it is used to process both patient's and caretaker's signup and login validations, GPS tracking and navigation, validating information of friends and family members, quiz and flash cards and the reminder of medicine and exercises.

Module 3: Output

➢ Similar as the input, the output module consists of outputs of both the applications differentiated by the color.

➢ The output at the patient's side will consist of the display of personal information and data of friends/family members which was provided at the input. Along with this, a memory quiz game based upon the information of friends/family members which will help the patient to remember the names and faces of friends/family members. Lastly, it will consist of the notification of medicines and exercises that was provided as input by the caretaker.

➢ The output at the caretaker's application will consist of information about patient and the gps coordinates that will be provided by the patient.

Module 4: Database

➢ Firebase Database is used in the project. The role of the database is to store information.

➢ Different information's like user id's and password's, contacts, addresses, images uploaded, schedules and timings, gps coordinates and results of the quiz.

6. OUTPUT SCREENS

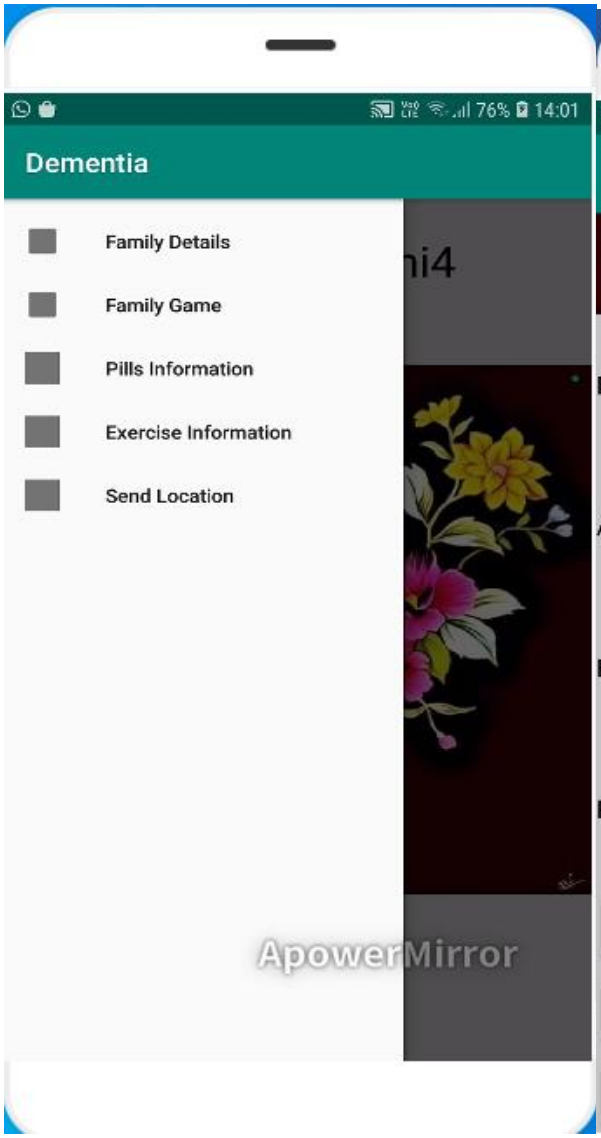

Fig 1: Dementia – app for patient's.

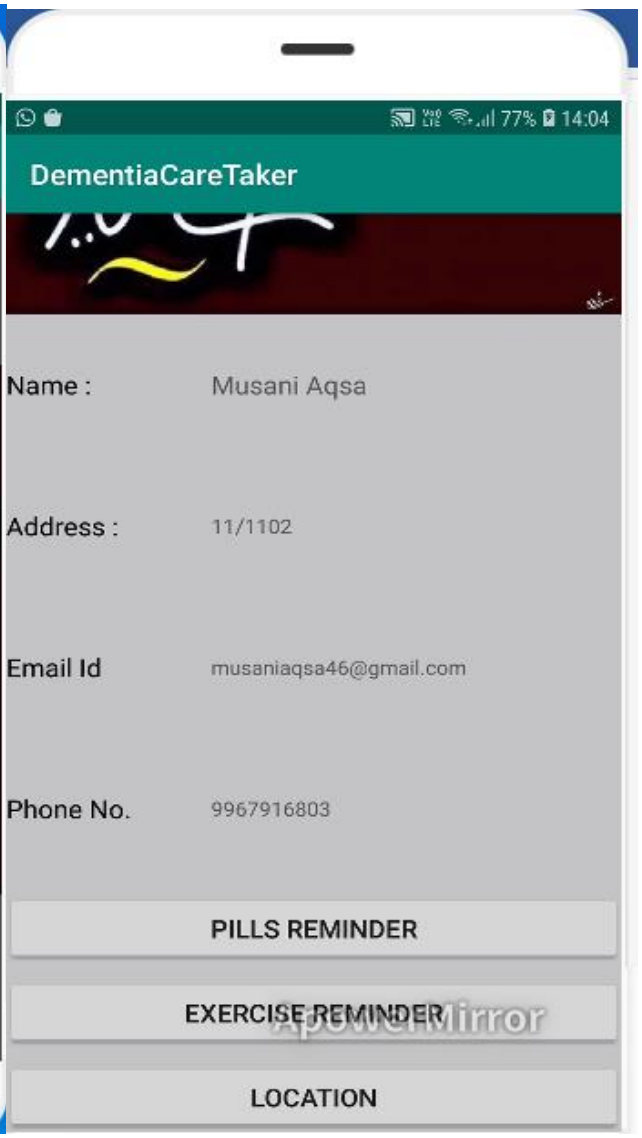

Fig 2: DementiaCaretaker app.

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Above are the output screens of the applications developed. The first figure is the ouput screen of Dementia- app for patient's displaying the different modules. The second figure is the output screen of the DementiaCareTaker – app that will be handled by the caretaker displaying the information about the patient like name, number, email, image and address. Along with patient details it consists of modules like pills and exercise reminder which will be provided as input notification to patient.

7. CONCLUSION

The application is thus designed to benefit the patient in all ways and to reduce the burden on the caretaker. The main aim of the app is to make the patient as independent as possible.

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