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# Android and Internet of Things (IOT) Based Alzheimer Care/Rehabilitation System to Monitor and Progress Patient Health Condition

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**ABSTRACT:** The proposed system is mobile based system for Alzheimer patients. The Smartphone device application will be used to guide the Alzheimer patients to help them in their day to day activities, the Internet of Things IoT can play main role to assist the Alzheimer patient, we will also targets the nearest relative of patients using special android based app to guide them. The application provides various games and quiz to boost patient brain functions and display progress report. It provides notification of placement of various objects and daily reminder of food and medicine. It also gives location of patient to care taker using GPS functionality. Photographs of family members play an important role in assisting patient. Iot device is used for sensing the condition of patient using wireless medium. The main aim of this system is to create a working environment for patient at home and reduce health expenses and also put fewer burdens on health care professionals.

**KEYWORDS:** Alzheimer; Android; Internet of Things IoT; Smartphone app; GPS; Reminder

### I. INTRODUCTION

Alzheimer's disease (AD), also known as just Alzheimer's, accounts for 60% to 70% of cases of dementia. The word dementia describes a set of symptoms that can include memory loss and difficulties with thinking, problem-solving or language. It is a chronic neurodegenerative disease that usually starts slowly and gets worse over time. The most common early symptom is difficulty in remembering recent events (short-term memory loss). Alzheimer's disease, named after the doctor who first described it (Alois Alzheimer), is a physical disease that affects the brain. Alzheimer's is a progressive disease. This means that gradually, over time, more parts of the brain are damaged. It affects about 6% of people 65 years and older. Alzheimer is an incurable disease [1].

People affected with Alzheimer 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. Behavioral 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 [2].

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 and hence to promote independence and participation in social activities. Our work also aims to give Alzheimer patients a sense of competence & ability to handle behavioural problems and take best decision thus thereby reducing the burden on caretakers.



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In this application, we also will make use of IoT Devices. The Internet of Things (IoT) is a system of interrelated computing devices, placed into our everyday used objects to share and receive data enabling communication [3]. IoT will be used in the device which will be wore on the wrist by the patient which will be helpful in tracking the patient by the caretaker at their home environment i.e. identifying whether the patient is in bedroom, kitchen, bathroom etc and it will be notified to the care taker via the notification on care taker mobile if the patient moved from one room to another room and also it will specify to the patient that he/she has moved to particular room [4]. Also to it is used for finding abnormal activity of patient such as patient don't get up on time even after he is notified as an alarm then the sensor on the patient wrist will track the pulse of patient and if it is not within the specified range and compares the time with set time of patient to wake up then a notification will be sent to caretaker of such abnormal activity. Also if pulse rate is above 100 beats per minutes which indicate fever and helps us to identify fever which will be notified to doctor [5].

## II. MOTIVATION

Needs towards development of Alzheimer care system

- 1) Patient often wanders off so to increase confidence in patient by boosting their memory.
- 2) Constant support of caretaker and health care professional is required so to put fewer burden on caretaker.
- 3) Patient goes out of home for some activity so to track the patient and help patient in their activities.
- 4) Patient should take medicines on time so to provide reminder as a notification to patient.

## III. LITERATURE SURVEY

Alzheimer is the disease which affects the memory of person. Nowadays due to excess stress condition it is also occurring at the early age. As per study till 2016, 4.86% of people aged >55 has been suffering from Alzheimer [6].

### I. Stages:

There are 3 stages in AD

1) Early Stages: In this stage person may function independently. Still the person may have memory problems. Patient forgets familiar words etc. Common problems are:

- Difficulty in remembering names
- Difficulty in performing social tasks
- Trouble in planning and organizing events

2) Middle Stages: This stage condition last for many years among Alzheimer patient. Patient gets frustrated and angry, acting uncertain, refusing to do daily routine tasks etc. Common problems are:

- Forgets personal history
- Forgets to sleep
- Get lost somewhere

3) Late Stages: This stage is considered to be worst stage where people forgets to breath and unfortunately dies. Patient requires extensive care. Common problems are:

- Need full time assistance
- Difficulty in communication
- Suffers from infection [7].

## IV. EXISTING SYSTEM

### I. Alzheimer's Daily Companion:

Features:

- Free and immediate advice and tips.
- 24-hour care giving assistance via toll free phone no or email.
- Access all tips and advice without internet.



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Drawbacks:

- No GPS to solve wandering problem.
- Need constant support of human caretaker.
- Does not provide family details, reminder, schedule etc [8].

## II. *Alzheimer Caregiver Buddy:*

Features:

- Get instant caregiver help and advice.
- Access free help from the 24/7 Alzheimer's Association helpline

Drawbacks:

- No tracking of patient movement
- Need caretaker constant support [9].

## III. *Samsung Memory Recaller:*

Features:

- Helps patient remember their personal details.
- Add photo using camera and add relationship.
- Takes photo instantly and compares with one in database and speak their name and relationship with patient.

Drawbacks:

- Camera need to be kept on state continuously [10].

## V. PROPOSED SYSTEM

Alzheimer has no pure and complete medication available. As there is no medication for this disease, we can slow down the progress of Alzheimer by taking care of patient and reminding them of everything surrounding them including their self too. But that is not possible for the Care Taker all the time to be with patient [11]. So here we are presenting a solution for this problem by developing an "Android & IoT based Alzheimer Care system to Monitor and Progress Patient's Health Condition" which is basically an assistive application for Patient known as AlzhiCare. Our system will reduce the burden on care taker, and provides useful activities to keep patient alert.

The goal for Alzheimer Care System is to progress the patients capabilities and improving their overall quality of life. The patient may not be in the active state always and capabilities are not always good because the memory deteriorates as time passes. Also, caretakers have to keep track on patient 24/7. The patient may not be able to visit a doctor for regular check-up, because of inability to make their way to the clinic or hospital. AlzhiCare helps the doctor to keep track of the progress of a patient through games and quiz. The care taker can locate the patient whereabouts by using the medical wearable sensors equipped with IoT which tracks the patient's movement at home. Also identify abnormal activity of patient using IoT. When sometimes patient wants to visit physician the patient location via Mobile Phone GPS will be notified to caretaker and if something wrong happens then a help button can be pressed by patient and the current location will be sent to Caretaker as well as the Doctor and Police Station. AlzhiCare application can provide facility to store personal details of patient, caretaker as well as family members like pictures, name, relation etc which can help patient to recollect the family. Also the caretaker can set the reminder to have medicine to patient as well as to the caretaker which can trigger on patient device on its time [12]. The caretaker can display the full day schedule to patient. Important objects of patient at his home will be regularly updated by caretaker so that patient can check the place of object where it is kept from the AlzhiCare Application. The system provides patient with the facility to play various games/quiz which can generate intelligence report and determines the progress of the patient.

Our app aims to provide following functionalities:

- Alzheimer Care System helps the patient to remember faces/names of family members
- Gives reminder to have medicine
- Play mood changing music to relax patient mind.
- The application tracks location of patient through Mobile based GPS.

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- It tracks the movement, abnormal sleeping activity and disease of patient through wearable sensors equipped with IoT.
- It provides schedule as reminder alarm and information on location of patients objects.
- It also helps the patients to estimate his/ her progress by progress report which will be generated by playing games.

## I. Block Diagram:

The proposed system is capable of keeping track of the entire task performed by patient to make patient independent and make real time monitoring in patient's progress. Acquiring the assistance of an app the patient will get the benefits as of having caretaker all the time. The detailed system and the scenario are discussed below using the block diagram and also the flow of the system.

Components are shown in the diagram as an interrelated part of an app. As an assistive application this is going to be a care-buddy for the patient. It provides patient control over his/her action doing so normally makes him/her nervous since patient mental condition is not completely stable. Starting from recalling his/her own personal information to details of each and every family member provided with the relationship between patient and the members. Adding the feature of event or activity tracker which basically keeps track of every single activity performed by the patient and even reminds it to perform the activity. Reminder function is very helpful for patient as well as caretaker to have an eye on patient regardless of being there with patient or not. This was about the normal day to day events, when and how it supposed to be completed. Having the feature of GPS tracking this system can solve problem of wandering patient at the outside world which is reduced to some extent as caretaker or other family member will have location of patient and in case of emergency a help button can be pressed by patient which will send patient current location to caretaker as message. Also there will be a brain exercise for patient which is a mind game with some levels from easy to difficult and that will decide how much improvement does patient make. The report will be generated after patient has played the game and will be sent to the caretaker as well as the doctor. The doctor can provide prescriptions and advice or health tips based on generated report.

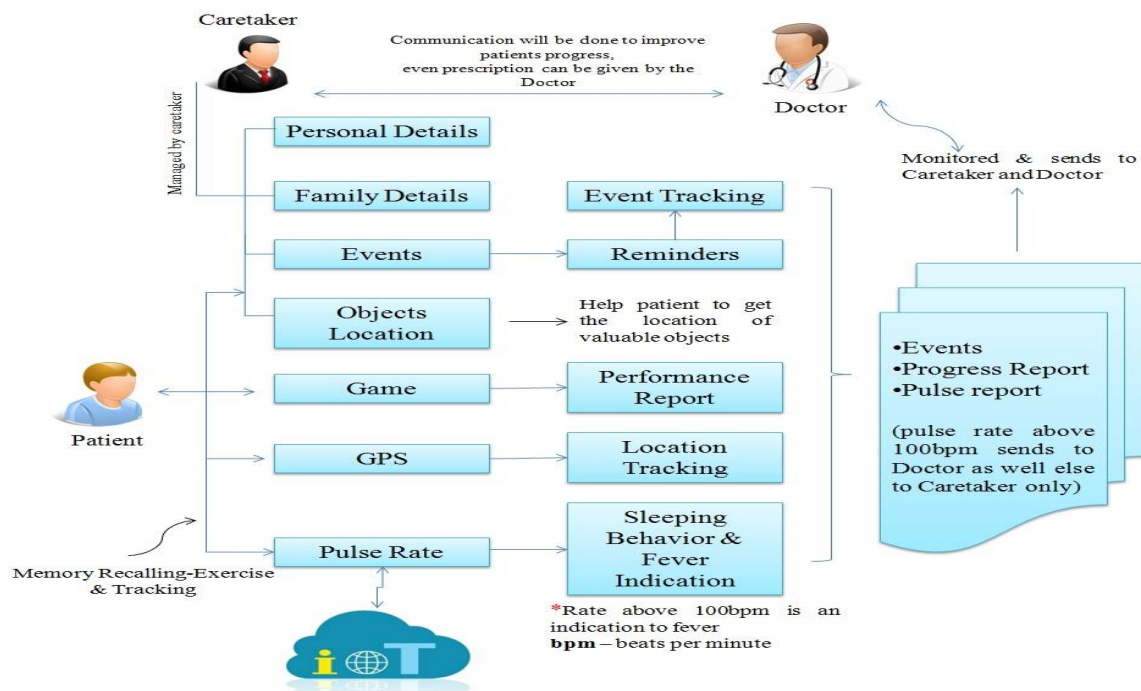


Fig.1. Block diagram of proposed system



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## VI. SIMULATION AND RESULTS



Fig.2. Patient Home Screen

Fig shows the home screen of the patient which contains various features to help him to identify, locate, remind & track his progress.

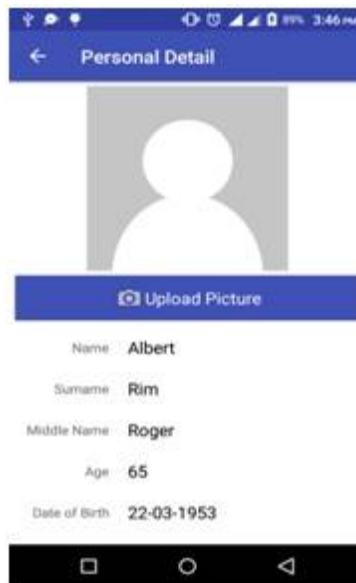


Fig.3. Patient Personal details

Fig shows the personal details screen which contain profile image of patient, along with his date of birth, age, address, profession, contact number.

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Fig.4. Patient Family Details

Fig shows the family details screen which contain profile image of family members, along with the name, relationship, and phone number to contact.



Fig.5. Patient Current Location

Fig shows the current location of the patient. This location is also visible to the caretaker so that he can track user's current location.



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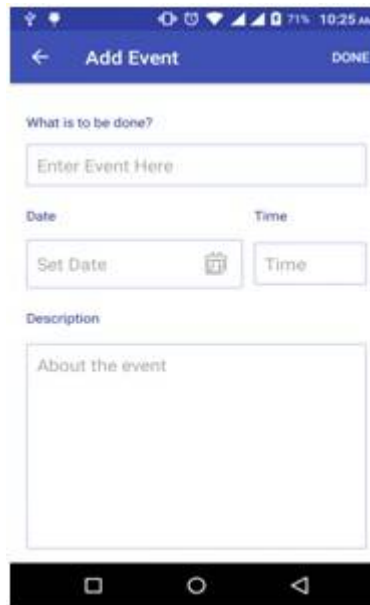


Fig.6. Add Events

Fig shows the add event which will be used by the caretaker to set the events to be performed by the patient which includes the event, its date, time and description.

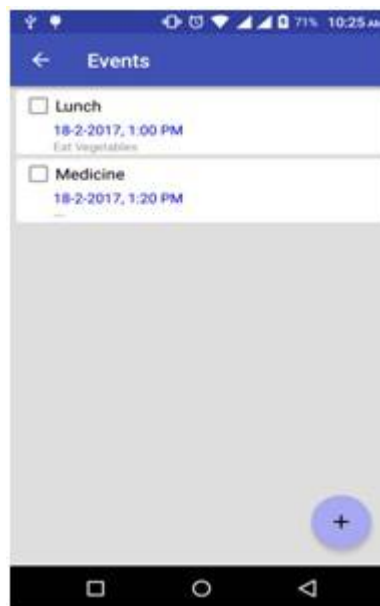


Fig.7. Events

Fig shows the events which has been generated on the patient's device. A patient should right click on the event if the event has been performed. This notification of event completion will sent back to the caretaker





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## VI. CONCLUSION

Android Application plays an important role in assisting patient thus enhancing their lifestyle. Patient wandering problem is reduced to some extent as the patient is helped by caretaker and the patient will have less chances of getting lost.

Event missed by the patient is handled efficiently by acknowledging the caretaker about event completion. Progress of patient is enhanced as generated reports make improvement in patient health. IoT enables the caretaker to identify the abnormal sleeping activity.

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