

## Alzheimer's Virtual Caregiver

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### ABSTRACT

In the early 90's, a great number of studies began to highlight the problem of the increasing number of people with Alzheimer's disease. The 21st century is typical of the development of advanced technologies that penetrate all areas of human life. Tools like digital devices and intelligent applications can help seniors with Alzheimer's disease and allow better communication and control of their caregivers. The aim of this project is to build a device that will provide an independency to the Alzheimer's patient and reduce the work for care-takers using Assistive technology. The device provides various functionalities like tracking the live location of the patient through GPS technology, reminding about medicines and food timing push notifications, and reduce the work of real caregiver(s), since it takes a lot of people to provide care to an Alzheimer's patient but with the help of this device only one person is required to check the functionality of the device, whether it is working fine or not and since the device will always be telling the location of the patient so no real caregiver is required to be there with the patient.

### 1. INTRODUCTION

India comes third in the world highest caseload after china and the US with more than 4 million people suffering from Alzheimer's and other forms of dementia. Worldwide, at least 44 million people are living with dementia making the disease a global health crisis that must be addressed. There are only 4% to 5% cases where people have Alzheimer's disease before the age of 65 most of which are genetically caused. Alzheimer's disease also known as just Alzheimer's, reports for 60% to 70% of dementia. It is neurodegenerative disease that occur when the brain no longer functions properly, where in the early stage the symptoms may be minimal, but as the disease causes more damage to the brain, symptoms worsen. The most common symptom in the early stage is the short-term memory loss (difficulty in remembering events).

Since, Alzheimer's patient have short term memory loss so they face some common problems like getting lost, wandering off, repeating questions, growing confusions, taking longer to complete daily normal tasks and personality and behavioural changes. To help with such kind of problems, Alzheimer's patient has one or more than one caretaker with them who helps them in day-to-day activities.

Alzheimer's Virtual Caregiver is a device which will take care of the patient virtually instead of the real care taker, which helps the patient to take medicines on time, follow full day schedule, etc. The device will help in reducing the work of care-taker. It also helps to give direction to the patient's home if in case Alzheimer's patient is lost or forgot about his/her place. The main aim of this project is to make the Alzheimer's patient as independent as possible. The Virtual Caregiver will be attached to the patient's body every time and the real care-taker can monitor the device regularly to see if it is following all its functionality.

### 2. LITERATURE SURVEY

Alzheimer's destroys memory and other important mental functions. Alzheimer's disease is the most common form of dementia. Dementia is not a specific disease. It's an overall term that describes a group of symptoms associated with the decline in thinking and memory skills. Alzheimer's disease has three phases:

### 2.1 *Early Stage:*

It is also known as the mild stage of Alzheimer's. Early stage has a time span of about 2 to 4 years. The person is not dependent on anyone. However, the person can have some memory loss, such as forgetting names and places that are familiar. Some disease effects include:

- Taking longer to complete normal tasks.
- Confusion with time or place.
- Repeating questions.
- Poor judgement.
- Personality and behavioural changes.

### 2.2 *Moderate Stage:*

It is also known as mild impairment. This stage is typically the longest stage and can last for 2 years to 10 years. Some disease effects include:

- Damage occurs in areas of brain that control language, reasoning and conscious thoughts.
- Memory loss and confusion grow worse.
- People may have hallucinations and delusions.

### 2.3 *Severe Stage:*

The time span of late stage is only 1 to 3 years. Individuals lose the ability to respond to events around them and communication becomes difficult for them. Some disease effects include:

- Full-time assistance is required.
- Difficulty in walking and moving, resulting in chair-bound or bed-bound.
- Increasing difficulty in communicating.

Intelligent Personal Assistant technology is a device or software agent that performs tasks or services for individuals to improve their independence. Technologies and apps (programs of mobiles and tablets) are also being used by persons with dementia as well. Technology can support people in carrying out their daily activities, increased safety, monitor health and increased social participation. Intelligent Person Assistant technology is able to help people with:

- Thinking and understanding problem.
- Hearing aid.
- Finding the directions of a location.

Mobile phone technology can be used to perform medical tests like measuring glucose level, blood pressure, and heart beats count.

The inception of Alzheimer's disease cannot be stopped yet but with the help of intelligent personal assistant technology, the patients can be made independent and technology can be configured based on the symptoms of Alzheimer's patient at each stage.

The main aim of our work is to improve the living of Alzheimer's patient by making them independent and reducing the burden on real care-takers. Following features such as GPS, Reminder, etc. can be included in the device that can help in reducing the symptoms of Alzheimer's.

GPS tracker is the technology that makes use of GPS (Global Positioning System) to track the location of anything that it is installed on. The recorded location data can be transmitted on internet-connected-device embedded in the unit. GPS tracker can be used to track location of Alzheimer's patient.

Reminder is an application software that is designed to alert the user of important events. It reminds the patients to take correct medicines on time. The alert can be issued repeatedly until it is cancelled by the user. The in-take records of cancellation can be stored and care-taker can have an account of it.

### 3. METHODS AND MATERIALS

Alzheimer's Virtual Caregiver is made up with Arduino Nano, ESP8266, APR33A3, GPS module and a 2 X 16 LCD screen. The heart of the device is the microcontroller Arduino Nano.

GY-GPS6MV2 is a gps module used for providing the location of the Alzheimer's patient by updating the co-ordinates of the device on the dashboard and the caregiver can then get the live location of the patient. The module will be connected to the Arduino. 8Ch voice Rec/playback is a module which records 8 real voices with a total recording time of 11 mins. Having a good knowledge of filters and microphone biasing circuits will completely eliminate the noise factor. Arduino uno Rev3 is the heart of the Alzheimer's virtual caregiver. It is connected with every component and involved in every step of the functioning of the device. ESP8266 is a microcontroller which has the ability to perform wifi functionalities. ESP8266 12E is used in implementing the device and controlling the wifi functions.

GY-GPS6MV2 module is designed to start locating the geographical location from the respected satellite. As soon as we give power to the Arduino, the power is supplied to every module and each module then start working. We need to first have the WiFi ON for the ESP module to connect to the WiFi to work with the Blynk app for having the location in real-time. We also get a 2 X 16 LCD screen notification on the device as soon as a reminder triggers and it goes on loop until the person triggers a push button that is placed in the device to stop the loop and assure that the person has successfully taken the reminder. As in Figure 1, GPS module is connected to the WiFi module which provides the data i.e. the co-ordinates to the WiFi connection to the Blynk app and the latitude and longitude are then shown in the interface of the Blynk app.

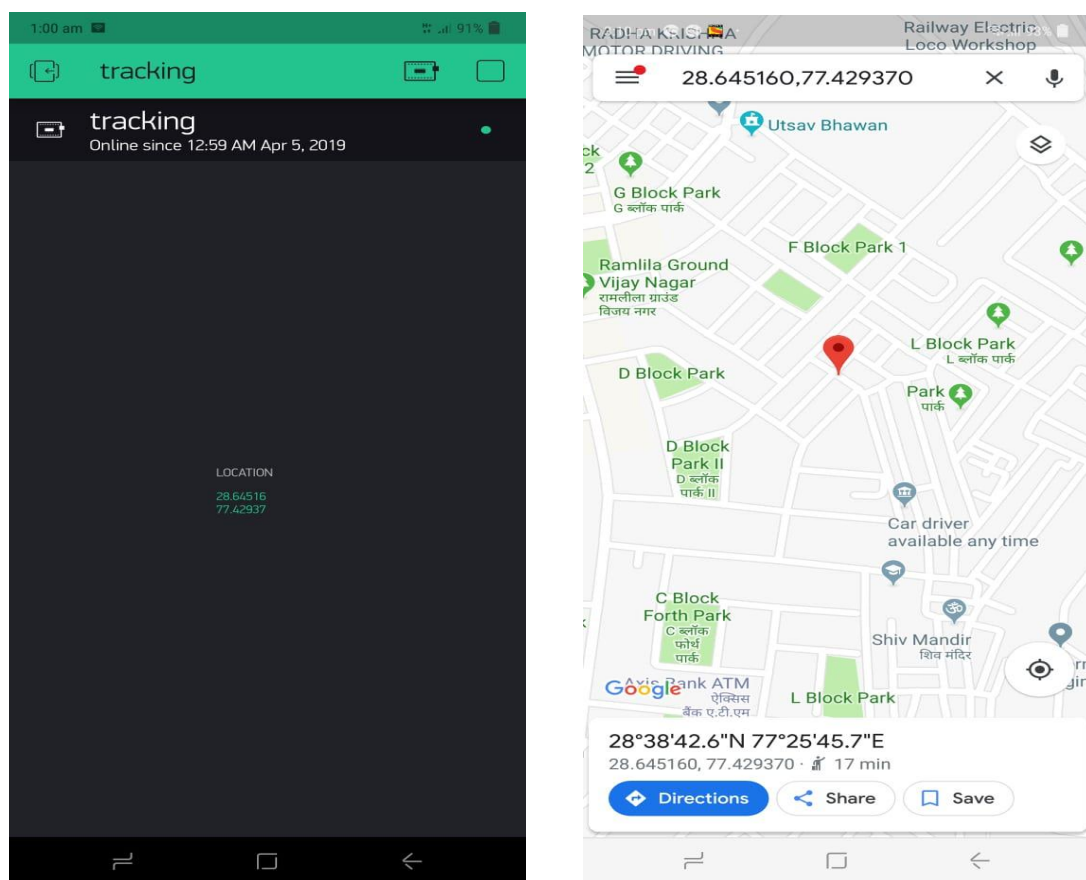


Figure 1. Screenshot of Blynk app.

#### 4. CONCLUSION

Patients who suffer from Alzheimer's disease do benefit from a safe physical environment, which promotes confidence and independence in them and ensures their safety. The device is able to help the patient remember about the medicines and his daily tasks he has to perform by adding the reminders on a daily basis by the real caregiver. It is able to detect the live location of the patient which helps the real caregiver if the patient gets lost. Alzheimer's patients may always feel best in their homes, provided that they are supported by technological solutions which assist them with their everyday tasks. To ensure their safety, one caregiver has to be around for checking the proper functionality of the device and ensuring that the symptoms are same. If the symptoms start to become worsen, then the device must be made function according to the symptoms noticed and the patient needs to be given medical concern from time to time.

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