ALZHEIMER'S ASSISTANCE

[1]Mr. NIDHIN K V, [2]SNEHA T S, [3]RAICHAL ANTONY, [4]YADUKRISHNA K S

Dept of ECE
Universal engineering college
Thrissur.

Abstract- **The increase in the number of people with Alzheimer's disease is a significant concern in numerous countries. Hence, new results for precluding, detecting, and supporting persons with the disease are needed. The end of this design is to develop a prototype that provides cerebral support services and ensures secure transferring of information that can be delved by a family member to cover the person with Alzheimer's disease. Our system tracks the position of the person with announcement and sends an alert if the person leaves a specified area. Our system is useful for persons who are affected by mild and moderate Alzheimer's disease. It supports them in flashing back their family members. Our results show that our system is effective for detecting the images of the family members of a person with announcement while icing a high delicacy and perfection compared to other standard ways**.

Keywords: **AD, CNN, facial recognition, IoT.**

I. INTRODUCTION

Alzheimer's disease is a progressive disease in which the destruction of memory cells causes slow depreciation in memory, thinking and reasoning skills. A great deal of difficulties is faced by an Alzheimer's patient including short term memory loss, aggression, loss of communication skill, repetitive behavior, anxiety, agitation etc. The number of people affected will double every 20 years to 81.1million by 2040.

The increasing rate of Alzheimer's patients is not uniform for all over the world. The experts have forecast the increasing rate by 100% between 2001 and 2040 for the developing countries whereas the rate is more than 300% for India, China, and their south Asian and western Pacific neighbors. The number of patients facing dementia caused by Alzheimer's disease is increasing in the entire world including Asian sub-continent.

There is currently no cure for AD. However, Artificial Intelligence (AI) has enabled a shift to more preventative medicine. Besides that, AI tools have shown their efficiency for designing assistance-based solutions including mobile applications, devices and chatbots that provide support to patients. Moreover, deep learning is a field of machine learning which adopts a structure that is similar to artificial neural networks (ANN). It embraces a set of algorithms that run on a multi-layer architecture to analyze

The performance of CNNs for detecting AD exceeds the performance of existing machine learning algorithms. It is worth mentioning that some AD assistance-based solutions exist. Thus, our project develops a solution based on facial recognition and security tools to help Alzheimer's patients and improve their lifestyle. With the advancement of technology, it is seen that, technology plays a vital role as caregivers for those people who cannot take care of themselves. Therefore, the objective of this research is to develop an intelligent assistive tool for Alzheimer's patients to ease their daily life. In this context, using our system, the person with AD will have the ability to identify family members. More importantly, we have designed CNN for facial recognition. Additionally, a reminder mechanism to help AD patients is introduced. Other features provided by our solution concern sending notification when the patient with AD leaves a safety zone.

II. RELATED WORKS

P. Rantanen,et.al.,[1]developed an In-home Advanced Robotic System. Robot is designed to care for patients and remind them of the Time of medicine and give them medicine, electronic Monitoring and dispensing systems D. Rebedew, et,al.,[2] Developed My MedSchedule Mobile. This application allows patients to manage their medications by placing reminder

K. Tsui, et,al.,[3]. Developed VGO Robot. VGO robots (VGO items are digital items generated using blockchain technology) allow a patient to navigate and interact with people in a different location

P. Bifulco, et.al.[4]developed ECG Bluetooth Portable Device. It will detect the beginning of the heart attack using smart phone Bluetooth technology such as electrocardiogram (ECG).

Huafend, et,al,.[5] developed patient. Monitoring Apparatus .Patient monitoring apparatus is patient control system has a one-camera control system that defines a three-dimensional model of the person. Moreover, it triggers an alert in case of danger.

Dr rlene et,al,.[6]"Technology and personhood in dementia care" Quality in Ageing Volume 7 Issue 1 March 2006 Arlene Astell conducted research on electronic tagging, smart technology, and interventions to focus on improving communication between people with dementia. Dr.Bharucha, et,al,.[7]held an extensive search that analyses environmental sensors and cognitive devices. Bantry&Paul et,al,[8]conducted research on electronic tracking through GPS and a location device to track people with dementia one who wanders.

The GPS tracking method researched by Sara Paiva et,al,.[9]suggests a low-cost tracking system of patients.

HaiandTRAN et,al,.[10]made an android application with the help of an accelerometer to detect the fall. Drew Dara, et,al,.[11]describes cognitive surveying as characterizing people's spatial knowledge. It is used as a tracking system using GPS to label landmarks.

Neuhaeuser et al,.[12] proposed a system to monitor ADLs by a body-worn eventlogger based on microcontroller and radio modules. However, no system has been presented so far, which utilizes RGB-D sensors and visual
behavioranalysis for the purpose of ADL monitoring
Gupta et,al,.[13]Proposed a diagnosis method for the classification of AD using the ADNI and National Research Center for Dementia (NRCD) dataset by combined features from cortical, subcortical, and hippocampus region from MRI images which achieve the better accuracy of 96.42% for classification of AD vs Healthy Control (HC).
S.Ahamed et al.[14] proposed the ensemble CNN model for feature extractor and SoftMax classifier to diagnose AD diagnosis. This model prevents overfitting and achieves an accuracy of 90.05% by using the left and right hippocampus area in MRI images.
A. Basher, et,al,.[15]. Come up with a method to localize the target regions from large MRI volume to automate the process. Based on the left and right hippocampi, the method achieves the accuracies of 94.82% and 94.02%

III. METHODOLOGY

The methodology section of the paper outlines the steps taken to develop and test the system. The authors used a combination of qualitative and quantitative research methods to evaluate the system's performance and effectiveness.
The methodology included the following steps:

1. Design and development of the IoT system: Physical objects containing sensors, processing power, software, and other technologies are referred to as "Internet of Things" (IoT) when they connect to other systems and devices over the Internet or other communications networks and exchange data with them. The authors have designed and developed an intelligent IoT system that could assist individuals with Alzheimer's disease in their daily lives. Here the authors have used Blynk application. Blynk is an Internet-ofThings platform for iOS or Android smartphones that allows users to remotely operate devices like Arduino, Raspberry Pi, and NodeMCU. The authors have used this application to compile and provide the right address on the various widgets to construct a graphical interface or human machine interface (HMI).
2. Caregiver's selection: The authors have recruited caregivers to test the system.
3. Location accessing: Tracking the location of Alzheimer's patients. Here the authors have used GPS module which is connected to the blynk application which allows the family member to access the current location of the patient.
4. Data analysis: The authors analyzed the data using both qualitative and quantitative methods. They used statistical analysis to evaluate the system's performance and qualitative analysis to understand the participants' experiences with the system.
5. System evaluation: The authors evaluated the system's performance based on several criteria, including accuracy, response time, and ease of use. They also evaluated the system's security and privacy features.
6. CNN: Designing a CNN that extracts the points of interests of the mouth, nose and eyes for binary classification of images into family member/not family member

Overall, the authors used a rigorous methodology to develop and test the IoT system. The study's findings suggest that the system has the potential to improve the daily lives of individuals with Alzheimer's disease by providing them with a secure and intelligent assistant that can assist with daily tasks.

A. BLOCK DIAGRAM

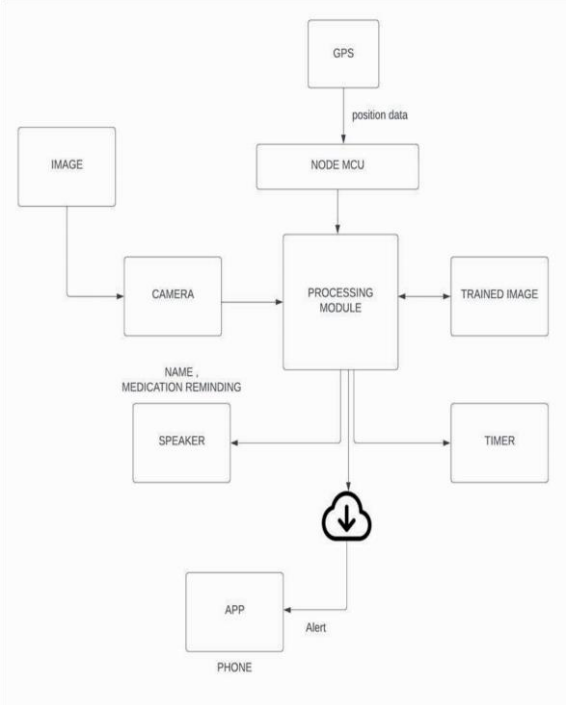

Fig.1. Block diagram of Alzheimer's assistance system

B. WORKING

A laptop connected to a GPS is utilized in the developed system to monitor the whereabouts of individuals with Alzheimer's disease. A convolutional neural network (CNN) has been created specifically for facial recognition. To address the challenge of recognizing human faces with a limited initial dataset, a novel technique is proposed in this research, which combines a CNN with an augmented dataset. The original small dataset is expanded into a larger one by applying various transformations to the facial images. By leveraging the augmented dataset, the distinguishing characteristics of the faces can be accurately extracted, leading to improved accuracy in facial recognition through the ingenious use of the CNN. A CNN that extracts the points of interests of the mouth, nose and eyes for binary classification of images into family member/nonfamily member. OpenCV provides a real-time optimized computer vision library. The system also provides medication reminding to the Alzheimer's patients. The medication reminding and the identified family members names are provided through the speaker in the system to the Alzheimer's patient

C. FLOW CHART

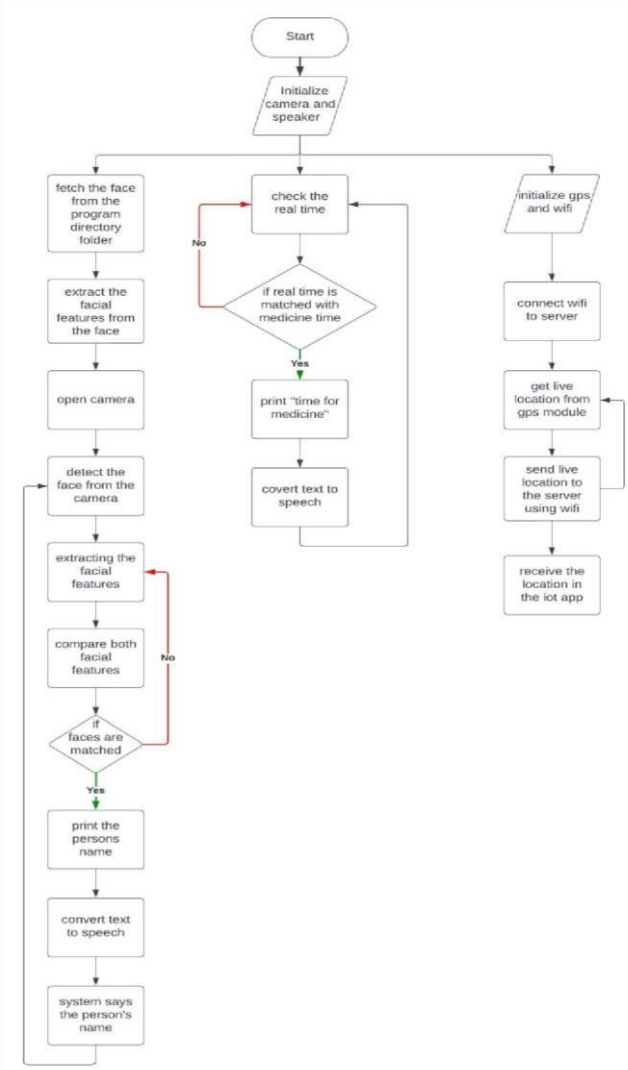

Fig.2. Flowchart of Alzheimer's assistance system

D. SAFETY MONITORING AND SECURITY

The purpose of our system is to remotely monitor elderly patients with Alzheimer's disease using a portable device. However, there are various types of attacks that can target the data generated by sensors or the network. To address this issue, we have created a comprehensive system that not only ensures the physical safety of the patient but also protects their personal information. Our location monitoring system, which uses GPS to locate the person with Alzheimer's, enables us to track their movements. We have used the blynk application to track the location of patients.

E. REMINDING SYSTEM

The reminder system works based on the information that is given by the patient and the caregiver. The patient is asked to fill the daily routines once they start using the application. The daily plans of the patient are updated in the reminder system. This system will remind the patient with the notifications to do the assigned work. The reminder gets completed when the patient acknowledges that he/she has done the work. The reminder system will also ensure to keep reminding the patient that he/she has done that work already.

IV. FUTURE SCOPE AND CONCLUSION

The number of assistance systems available to help individuals with Alzheimer's disease (AD) is limited, and current systems face difficulties with facial recognition and security features. This paper proposes a simple solution to provide assistance to persons with AD through a facial recognition system based on convolutional neural networks (CNNs). The system includes a GPS system. As future work, the authors suggest using a thermal camera to identify objects, performing 3D facial reconstructions to solve pose problems, and integrating voice to improve identification in cases of visual impairment and also a system that can be easily worn by the patients. We also suggest exploring the use of information theory to increase the efficiency and speed of the system.

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