IoT-BASED ASSISTANT FOR ALZHEIMER'S PATIENT WITH REMINDERSYSTEM AND TRACKING USING GPS

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Abstract— In many nations, there is serious worry over the rising incidence of Alzheimer's disease (AD).New approaches are therefore needed for preventing, identifying, and helping people with AD. Alzheimer patients are facing difficulties during day-to-day activities in terms of traveling and receiving accurateinformation from their surroundings. We have proposed a smart belt that overcomes most of the problems of Alzheimer's patients. The belt genuinelyaids in identifying the challenges encountered in daily life. The smart belt is embedded with Arduino UNO and a global positioning system (GPS) that helps in sensing emergency alerts. The proposed smart belt provides continuous information about the location of Alzheimer's patients to the concerned caretaker atan interval of five minutes. The pulse heart rate sensor installed on the belt monitors the health of theuser. This heart rate sensor is used to detect the heart rate, and when the heart rate increases a buzzer makes an alert sound and sends an immediate message to the caretaker about the increased heart rate and location. It also contains a speaker module that tells the phone number and address of the caretaker and also some important help line emergency numbers. Sensors are used for achievingthese functions. It supports them in remembering their family member's numbers. This smart belt is useful for patients with mild and moderate Alzheimer's disease

Keywords— Alzheimer Disease(AD), Internet of Things, Global System for Mobile(GSM), Global Positioning System(GPS),

1. INTRODUCTION

Alzheimer's disease is a brain disorder that gets worse over time. It's characterized by changes in the brain that lead to deposits of certain proteins. Alzheimer's disease causes the brain to shrink and brain cells to eventually die[1][10]. Alzheimer's disease is the most common cause of dementiaa gradual decline in memory, thinking, behavior, and socialskills.

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These changes affect a person's ability to function[2][13]. In the United States, 01 + 6.5 million persons aged 65 and older have Alzheimer's disease. More than 70% of them are 75 years of age or older. It is believed that 60% to 70% of the 55 million dementia sufferers globally have Alzheimer's disease[3-5].
The disease's early symptoms include forgetting recent conversations or experiences. It eventually leads to severe memory issues and a loss of the capacity to carry outdaily chores. The symptoms' progression may be slowed or improved by medications. Programs and services can benefit both those who are ill and the people who care for them. Alzheimer's disease cannot be treated; there is no cure[6][12]. Dehydration, starvation, or infection might result from significant brain function loss in its advanced stages. These issues have the potential to be fatal[11][14].

2. LITERATURE SURVEY

A system for monitoring the child in a crowded area was proposed. Using smart phones in the area and wearable technology, the crowd sourced children monitoring and finding (CCMF) framework may identify holding-up behaviors and locate missing children. The CCMF framework's monitoring mode helps shield young children from strangers or those with ill intentions who could try to kidnap them[1][8]. Through crowd sourced sensing networks created by smart phone users with outside GPS and inside IoT localization, the CCMF framework canjointly locate missing children equipped with wearable devices made up of mobile iBeacon and 3-axis accelerometer modules.

A system to monitor the mother and the child in her womb was proposed. The adoption of IoT for smart health applications is a relevant tool for distributed and intelligent automatic diagnostic systems[2][9]. This work proposes the development of an integrated solution to monitor maternal and fetal signals for high-risk pregnancies based on IoT sensors. The Fetal Heart Rate and a group of maternal clinical indicators such as uterine tonus activity, blood pressure, heart rate, temperature, and oxygensaturation are monitored.

Asystem to track and find a vehicle in an urban area to track the bus proposed. Cutting-edge public transportation system to make it easier to commute along a busy metropolitan street. The Global Positioning System (GPS) and Global System for
Mobile Communication module's wireless technologies form the foundation of the created system[3][7]. It computes route distance information using a distance-time-based algorithm and radar range sensor, and records and displays real-time vehicle location using the GPS-based greedy forwarding method (RRS).

A new idea designed to diagnose AD Convolutional neural network (CNN) and deep neural network (DNN) models combined in the suggested strategy. The suggested DNN model classified the AD and NC classes using the volumetric features that the DVE-CNN model had extracted [4][15]. Characteristics associated with the left and right hippocampi in the GARD dataset, we presented the average weighted accuracy values that we were able to acquire, which were 94.82% and 94.02%, respectively. Using left and right hippocampus volumetric characteristics, our technique identified 69 participants and 65 subjects from 80 AD subjects with high accuracy.

A system using Artificial Intelligence to guide blind people proposed in which most of the time, visually impaired persons need to rely on others. Blind people cannot walk without the support of a cane. The artificial intelligence of things (AIoT) is the solution to designing smart devices for the visually impaired[5][16]. We propose a smart stick that overcomes most of the problems of the visually impaired person. The visually impaired person can also

recognize objects and currency with the help of a deep learning algorithm applied to images captured by the camera installed in the stick. The pulse sensor installed on the stick monitors the health of the user.The smart stick is embedded with Raspberry pi and a global positioning system (GPS) that helps in sensing emergency alerts. Android application that is connected with firebase is also developed for tracking data about the user (health, location, etc.) from a remote location.

A device for Alzheimer's patients was designed. A collar prototype that the person with AD wears so that they are comfortable wearing it,using face recognition. A system for tracking an Alzheimer's patient's present location is developed using smart alert notifications, which are generated in the event that the patient leaves a specific area. The prototype, in particular, enables helping people with mild and moderate AD. With the use of a portable gadget for older people withAD and a designated listening device, the system attempts to assure the patient's physical safety[6][17]. The purpose of the developed collar, which is backed by an IoT application, isto help a person with AD recall his or her family members, recognizing more people thanks to the decrypted identity and other information concealed in the photographs that arenot provided. our prototype allows tracking the person withAD and may send an e-mail notification enabling someonewith AD to send a voicemail message to their Gmail account in the event that they are unable to read. The AD person's email application will display transcripts of the voicemails that have been forwarded. A notification serviceis also offered to inform the recipient when they receive anemail. As a result, the suggested prototype offers AD patients mobility support and psychological support.

Alzheimer's disease (AD) diagnosis is frequently challenging, particularly during the disease's early stage of mild cognitive impairment (MCI). Nonetheless, treatment is most likely to be successful at this point, therefore there would be significant benefits to improving the diagnosis procedure. We outline and evaluate a machine- learning strategy for individualized and affordable AD diagnosis [7]. It determines the sequence of biomarkers that is most instructive or economical for patient diagnosis using locally weighted learning to customize a classifier model for each patient. We compared AD to controls and MCI patientswho developed AD within a year to those who did not use ADNI data. By drastically lowering the quantity (and expense) of the biomarkers required to arrive at a certain diagnosis for each patient, the method performed similarly tolooking at all the data at once. As a result, it may help with the accurate and individualized detection of AD and be helpful in therapeutic settings.

TABLE I. COMPARISION OF EXISTING MODELS WITH THE PROPOSED MODEL

TABLE NO:	Parameters	Volumetric Feature-Based Alzheimer's Disease Diagnosis From sMRI Data Using a Convolutional Neural Network and a Deep Neural Network	AIoT-Based Smart Stick for Visually Impaired Person	Secure IoT Assistant-Based System for Alzheimer'sDisease	Crowdsourced Children Monitoring and Finding with Holding Up Detection Based Internet	An Optimal Decisional Space for the Classification of Alzheimer's Disease and Mild Cognitive Impairment	"IoT-based Smart Health System for Ambulatory Maternal and Fetal Monitoring	Proposed system-IoT-BASED ASSIST ANT FOR ALZHEIMER'S PATIEN T TRACKI NG USING GPS AND GSM
1	Location tracking	NO	YES	YES	YES	NO	NO	YES
2	Alert message	NO	YES	YES	YES	NO	YES	YES
3	Speaker module (reminder system)	NO	NO	NO	NO	NO	NO	YES
4	Bluetoothmodule	No	NO	NO	YES	NO	NO	NO
5.	Usage of MRI scan	YES	NO	NO	NO	YES	NO	NO

3. SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

A collar prototype that the person with AD wears so that they are comfortable wearing it, using face recognition. A system for tracking an Alzheimer's patient's present location is developed using smart alert notifications, which are generated in the event that the patient leaves a specific area. The prototype, in particular, enables helping people with mild and moderate AD. With the use of a portable gadget for older people with AD and a designated listening device, the system attempts to assure the patient's physical safety. The purpose of the developed collar, which is backed by an IoT application, is to help a person with AD recall his or her family members, recognizing more people thanks to the decrypted identity and other information concealed in the photographs that are not provided. our prototype allows tracking the person with AD and may send an e-mail notification enabling someone with AD to send a voicemail message to their Gmail account in the event that they are unable to read.

The AD person's email application will display transcripts of the voicemails that have been forwarded. A notification service is also offered to inform the recipient when they receive an email. As a result, thesuggested prototype offers AD patients mobility support and psychological support.

3.2 PROPOSED SYSTEM

The detection of AD is one of the most crucial public health issues because it affects so many people.AD is a degenerative condition that causes a gradual mental capacity and memory decline. So we proposed a solution that uses a GPS tracker [1]. When an AD patient moves outof the house, the Current location of the AD patient[2] willbe sent to the registered Phone as an SMS[5].The proposedsmart system provides continuous information about the location[3] of Alzheimer's patients to the concerned caretaker using GSM[6]. The pulse heart rate sensor [4] installed on the belt monitors the health of the user. Thisheart rate sensor is used to detect the heart rate, and when the heart rate increases a buzzer makes an alert sound and sends an immediate message to the caretaker about the increased heart rate and location . . It also contains a speaker module that tells the phone number and address of the caretaker and also some important helpline emergency numbers..

4. HARDWARE USED

- Arduino Uno
- GPS neo-6m module
- GSM sim 900a module
- Buzzer
- Lithium battery 12v
- Heart rate sensor
- Push button
- PCB board
- Power supply module

FIG 1. GSM and GPS Module

5. SOFTWARE USED

- Arduino IDE

6. LIST OF MODULES

1. Location Tracker
2. Heart Rate Monitoring
3. Reminder SystemLocation Tracker

The method for informing the family of an Alzheimer patient of their location on a regular basis and in a timely manner is covered in this module. The GPS Neo 6m module (The NEO-6M GPS module is a capable full GPS receiver with an integrated 25 x 25 x 4mm ceramic antenna that offers a powerful satellite search capability. The power and signal indicators let you keep an eye on the module's condition.)instantly records the location of the AD patient and the live location for a time gap of 5 minutes to their family when the patient leaves the range that was specified to him as the safest for him probably they're home. The GSM module, which is coupled with the Arduino board in the gadget, will transmit their precise location. The Arduino will use AT instructions to interact with the GSM module whenever the patient is in danger, sending "MESSAGE" to the pre-programmed cell number. Fig 5 depicts the location tracking. Users can send and receive SMS, and make andreceive phone calls using the SIM900A module.

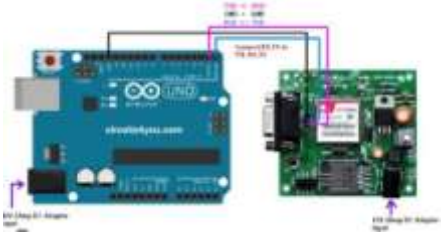


Fig 2-location tracking

Heart Rate Monitoring

It consists of a heart beat sensor (pulse heart Rate sensor) which monitors an AD patient's heart rate continuously. It is a sensor that is used to measure a person's heartbeats. An LED and an ambient light sensor are located on the sensor's front side and are responsible for tracking heartbeats. An amplification noise filter is present on the sensor's backside and is responsible for noise removal and pulse signal amplification. In order to obtain readings, the sensor must be placed directly above the vein. It consists of abuzzer. Whenever the heart rate increases buzzer makes a sound and makes a call to the caretaker immediately and sends their current location. It uses a GSM module, which is coupled with the Arduino board in the gadget, which will transmit their precise location. Figure 7 explains the workflow of this module.

Fig 3- heart rate monitoringReminder System
An intriguing third module provides the caretaker's contact information in case of an emergency. Figure 6 explains the workflow of this module. This aids inthe identification of the AD patient and enables him to contact his loved ones directly, or it can be used by members of the public to locate the AD patient and assist him. The AD patient's fainting is an exceptional circumstance. The AD sufferer can also find a reminder about his medications in a separate function that is beneficial. This circuit's Arduino generates tones of various frequencies and plays them through the speaker that is connected to it. Music is created by varying the tone's frequency (also known as pitch) and applying the appropriate timing. Through Digital pin 3, the Arduino outputs a signal that it has created. The speaker attached to the pin is driven by this to produce sound. Add an amplifier circuit between the speaker and the DAC0 pin in order to connect a speaker to the board. The speaker's loudness will be raised via the amplification circuit. Figure 4 depicts how Arduino and speaker is connected.

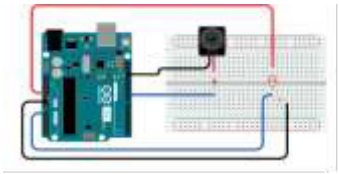


Fig 4- speaker module

8. WORKFLOW

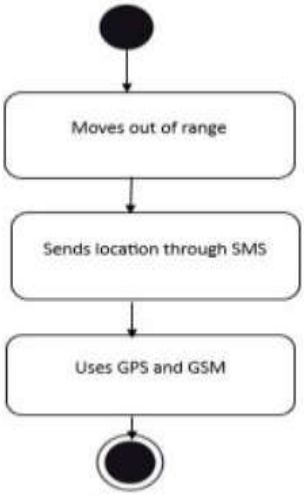


Fig 5-Location tracking flow

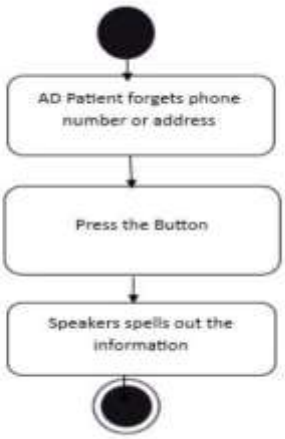


Fig 6-Reminder system flow

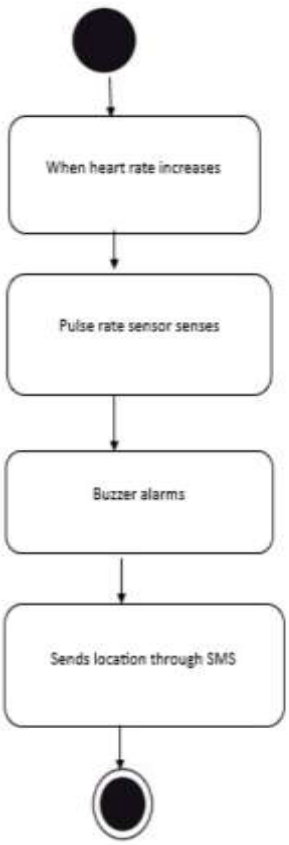
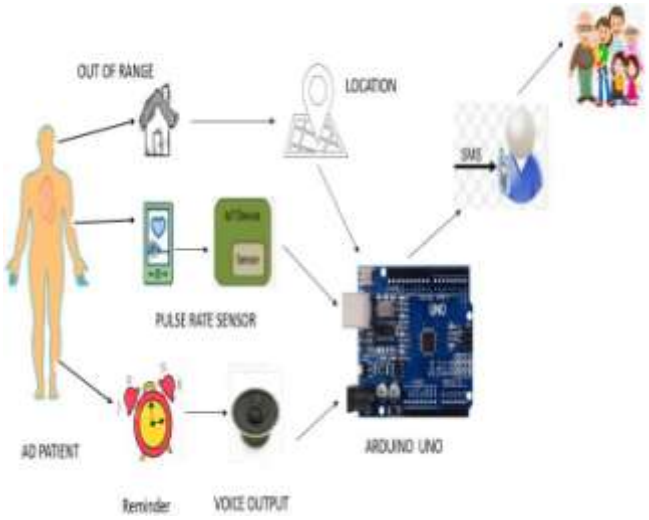
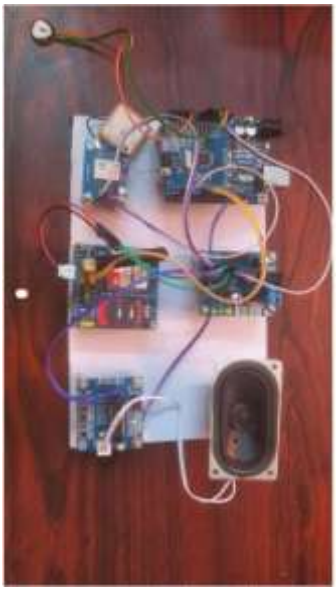


Fig 7-heart rate monitoring flow

8.1 SYSTEM ARCHITECTURE



9. RESULT AND OUTPUT



10. CONCLUSION AND FUTURE ENHANCEMENT

10.1 CONCLUSION

In this paper, we have helped Alzheimer's patients whoare facing difficulties during day-to-

day activities in terms of traveling and receiving accurate information from their surroundings. We have proposed a smart belt that overcomes most of the problems of Alzheimer's patients. The smart belt is embedded with Arduino UNO and a global positioning system (GPS) that helps in sensing emergency alerts. The pulse heart rate sensor installed on the belt monitors the health of the user. The proposed smart belt provides continuous information about the location of Alzheimer's patients to the concerned caretaker. Another feature of the developed prototype concerns the possibility of communication short messages between the person with AD and his/her member. It also contains a speaker module that tells the phone number of the caretaker. It supports them in remembering their family member's numbers. Our prototype is useful for persons who are affected by mild and moderate Alzheimer's Disease.

10.2 FUTURE ENHANCEMENT:

In our project, we send location to a single caretaker, in the future this data can be deployed with the cloud and it can be accessed by more than one family member with a security policy. The data can be password protected and the password can be shared among trustable Family members. With this new technique if any one member of the house moves out for any emergency other family members can guide.

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