Alzheimer Patient Tracking and Guidance System using GPS and GSM

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Abstract— Nowadays number of Alzheimer patients are getting lost. Alzheimer's is an urgent epidemic. "Alzheimer's disease is becoming an increasingly major medical problem worldwide. These patients lose their memory after a particular time depending upon how critical is the patient. To track them when they are lost or to get notified immediately when they are going to cross particular border we are proposing our system. Alzheimer disease patients need holistic attention by caregivers, due to the fact that they present with disorders of memory and orientation. However, communication with each patient is sometimes difficult. In this work we present a program to complement and support the daily activities of an Alzheimer's centre. This is achieved by means of touching tags with mobile phones.

Key words: Global Positioning System, Alzheimer, dementia, Global System for Mobile Communication

I. INTRODUCTION

Alzheimer's is an urgent epidemic. "Alzheimer's disease is becoming an increasingly major medical problem worldwide," says Nobel laureate Paul Greengard, PhD, Director of the Fisher Center for Alzheimer's Research at The Rockefeller University. The top ten symptoms of Alzheimer's disease are:

A. Memory Loss:

Forgetting recently learned information is one of the most common early signs of dementia.

B. Difficulty Performing Familiar Tasks:

People with dementia often find it hard to plan or complete everyday tasks. Individuals may lose track of the steps involved in preparing a meal, placing a telephone call or playing a game. Person begins to forget more often and is unable to recall the information later.

C. Problems with Language:

People with Alzheimer's disease often forget simple words or substitute unusual words, making their speech or writing hard to understand. They may be unable to find the toothbrush, for example, and instead ask for, "that thing for my mouth."

D. Disorientation to Time and Place:

People with Alzheimer's disease can become lost in their own neighborhood, forget where they are and how they got there, and not know how to get back home.

E. Poor or Decreased Judgment:

Those with Alzheimer's may dress inappropriately, wearing several layers on a warm day or little clothing in the cold. They may show poor judgment, like giving away large sums of money to telemarketers.

F. Problems with Abstract Thinking:

Someone with Alzheimer's disease may have unusual difficulty performing complex mental tasks, like forgetting what numbers are for and how they should be used

G. Misplacing Things:

A person with Alzheimer's disease may put things in unusual places: an iron in the freezer or a wristwatch in the sugar bowl.

H. Changes in Mood or Behavior:

Someone with Alzheimer's disease may show rapid mood swings – from calm to tears to anger – for no apparent reason.

I. Changes in Personality:

The personalities of people with dementia can change dramatically. They may become extremely confused, suspicious, fearful or dependent on a family member.

J. Loss of Initiative:

A person with Alzheimer's disease may become very passive, sitting in front of the TV for hours, sleeping more than usual or not wanting to do usual activities.

II. REVIEW OF PAST WORK

Several researchers have proposed technological solutions using RFID and GPS technology to assist visually impaired people. Amongst the assistive systems which have been reported are SESAMONET, iCane and Drishti. The SESAMONET system uses RFID technology for user localization and tracking. SESAMONET use a grid of RFID tags which are burrowed in the ground around a depth of 4cm. An RFID reader is attached to a cane to obtain the tag ID as the cane moves over the tag. This information is sent to a PDA where software looks up the navigation data for the tag ID. The navigation data is converted to speech using text-to-speech synthesis. The iCane system functions similarly to SESAMONET and also uses RFID technology for person localization and to store navigation data. RFID tags are placed on tactile pathways to be read by the RFID reader on the cane. Drishti which is an integrated navigation system for visually impaired people uses the Global Positioning System (GPS) and Geographical Information System (GIS) technologies. It is designed to be used within the university premises and contains a GIS dataset of the university. This contains geographically referenced information for both static and dynamic environments and is referred to as a spatial database. The spatial database is accessible through a wireless network to a wearable device that is carried by the visually impaired person. A differential GPS receiver in the wearable device determines the localization of the user.

Drishti is an assistive device which is operable in dynamically changing environments and can optimize routes

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for navigation when there is an unforeseen obstacle in the path. Like SESAMONET, Drishti gives assistance to the user by means of speech. Drishti may be considered as the first reliable assistive technology system which can help the navigation of visually impaired people in dynamically changing environments. However, there are two limitations with this system. First, the prototype weighs eight pounds. Second, the degradation of the RF signals inside buildings degrades the accuracy of the GPS localization. A comparison of the above discussed interactive assistive.

III. SYSTEM ARCHITECTURE

Here we are making the GPS kit with path guidance. This can be kept with the patient either in one of his shoes or somewhere else. Then we store the co-ordinates coming from the GPS and the name of the place in to the SD card via the matrix KB. Also we store the voice from the user which records the name and other information about the place which can guide the person wearing the shoes.

After this as soon as the user wears the shoes and goes out, the µc continuously compares the latitude and the longitude co-ordinates coming from the GPS every second with the co-ordinates stored in the SD card memory.

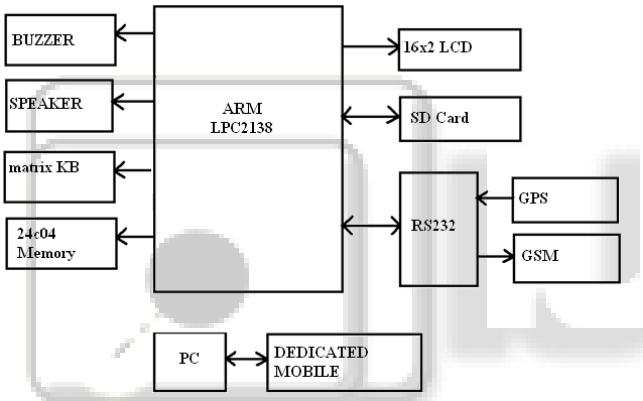

Fig. 1: Block diagram of the system

If at any place the co-ordinates match then for that particular place he can see the name and other details of that place on the LCD and also can hear the info about the place from the earpiece. Also we are sending these co-ordinates to the base unit via the GSM modem .The PC receives these co-ordinates via GSM and redirects these latitude and longitude co-ordinates to the visual basic software .The VB s/w then shows these co-ordinates on the GOOGLE map so that we can exactly locate the location of the user.

Thus the wireless helmet is a very efficient tool for path guidance and also for tracking the user wearing the helmet via Google Maps.

A. LCD Display:

The block diagram is enabled with LCD display for showing different messages. LCD is connected to PIC using port pins.

B. GPS System:

The GPS smart receiver features the 16 channels .Ultra low power GPS architecture. This complete enabled GPS receiver provides high position, velocity and time accuracy performances as well as high sensitivity and tracking capabilities.

C. Power Supply:

The supply to each block is given separately. The step down transformer is used to convert high AC voltage to low voltage. The bridge circuit with four diodes connected for AC to DC conversion. Filter block is used for removing ripple from the output of bridge.

The regulator is for the regulated output like 7805 for 5V, 7812 for 12V. This regulated output from the power supply is given to PIC microcontroller, Stepper motor, DC motors, Driver circuits, multiplexers, sensors, LCD display. The supply for GSM module is used for 12v 1A.

D. Voltage Regulator:

The LM317 series of adjustable 3-terminal positive voltage regulators is capable of supplying in excess of 1.5A over a 1.2V to 25V output range. They are exceptionally easy to use and require only two external resistors to set the output voltage. Further, both the line and load regulation are better than standard fixed regulators. Also, the LM317 is packaged in standard transistor packages which are easily mounted and handled.

IV. ALGORITHM FOR ALZHEIMER PATIENT TRACKING SYSTEM

1) Initialize ARM ports pins and initialize LCD.
2) Initialize UART for serial communication and set baud rate (9600).
3) Initialize SMS for GSM modem.
4) Initialize keyboard.
5) Initialize SPI for SD card to store the information.
6) Initialize I2C for external memory to store location.
7) After initialization, display project name.
8) Check receive interrupt flag is generated?
9) If yes, then check GPS $GPRMC command is received.
10) If yes, then read the longitude and latitude from the GPS and display on LCD.
11) After receiving co-ordinates check the next condition.
12) Check location store key is pressed?
13) If yes, then store location in 24c04 memory.
14) If no, then check next condition.
15) Compare current co-ordinate to the stored co-ordinate (longitude and latitude) in the 24c04 memory.
16) Check match is occurring in current and stored co-ordinates?
17) If yes, then play the relevant information about this place using speaker and SD card.
18) If no, then check SMS time >= 120 sec.
19) If yes, then send current location (longitude and latitude) to the server unit using GSM.
20) If no, then go to step number 8.

V. ACKNOWLEDGMENT

We thank Dr. Damodar J. Garkal (Principal IOKCOE Pune) for providing necessary facilities to carry out the work. We are very thankful to Prof. Sachin Ahankari IOKCOE Pune) for his useful guidance. We are also thankful to Head of our department Prof. A. Mhaske.

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