International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 07 | July-2016 www.irjet.net p-ISSN: 2395-0072

Tracking and Guiding Patients with Dementia using Wireless Sensor Network

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Abstract - *As a consequence of the aging of the world population, society and governments must face major challenges regarding people's health. In recent years, researches have been interested in investigating how the technology can be used to improve the healthcare and assistance of patients with dementia, as the Alzheimer's disease. In this paper, we propose a nonintrusive pervasive model to assist patients with dementia, based on the use of a wireless sensor network. Using high availability and low cost binary sensors, the proposed model is able to determine in real-time the location of a patient, and to emit alerts if one leaves a safe place without supervision.*

***KeyWords*: Dementia,Alzheimer disease,Wireless Sensor Network,Google map,Caretaker**

1.INTRODUCTION

The aging of the population implies that an increased number of people are going to need some form of care or assistance. In the present scenario 20-30 percent of the age persons suffer from a common mild cognitive impairment disease called dementia . Alzheimer`s disease and other forms of dementia are characterized by the loss of ones memory and cognition. Patients with this condition undergo rapid mood swings and often wander away from their homes without being aware of it, creating difficulty to the care takers in locating the patient [1]. Patients with dementia also forget the telephone numbers of their care givers and normal telephones are very complicated for their regular use. This in turn puts them at risk during emergency situation where they would struggle to communicate. Here we design a locator device, which alerts the caretaker about the location of the patient autonomously [4].

2.CONCEPT OF DEMENTIA

Dementia is a syndrome that causes a significant loss in cognitive ability beyond what would normally be expected from aging. It is typically seen in the elderly, however it can occur at any time in adulthood either through brain injury or for purely natural reasons. Alzheimers Disease is the most common form of the Dementia family of illnesses.
Unfortunately it is both incurable and terminal. Equating to 1 in 85 worldwide. Alzheimers disease kills off the more recently connected and newer brain cells, As a result this often makes the individual think that they are living in a former time and/or are much younger than their actual age [5]. This leads to serious confusion and many of he people that are affected attempt to return to a previous house or residence. Even though they may have lived at their current property for many years, possibly for over two decades in some cases, they can still feel certain that they live at the former residence [4]. The cost of keeping patients in nursing homes is considerable and is getting more substantial as the elderly population increases. On top of this there is often confusion in the patients mind, generated simply through the process of moving to the nursing of which is highly stressful for patient as well as their family and carers [3]. To tackle the problem, this research the employment of a virtual fence from the point of view of caring for a dementia patient. By different technologies the aim has been to to know when their patient or loved one has their house unassisted and secondly when/if they have traversed further than a geographically selected distance from their start point. Essentially the aim has been to throw down a virtual fence around the patients known location and for notification to be given when the fence boundary is crossed [7].

3.LITERATURE SURVEY

K. Doughtyt, G. Williamst, P. J. King, R. Woods in 1998 [1] ,explains the design of an integrated second generation telecare system which provides monitoring and support of demented patients living single in their own homes. It employs a number of non-invasive sensors to measure the patient's everyday activities and habits as a function of time in order to determine an on-going dementia lifestyle index (DLI). Local intelligence is employed to compensate for confusion while a telephone centre provides further information and reminders which can be displayed within the home environment.

Toshio Hori**,** Yoshifumi Nishida, Hiroshi Aizawa,Shmichi Murakami and Hiroshi Mizoguchi in 2004 [2], introduces an embedded distributed sensor network for a house for the elder which monitors positions of elderly people in a nursing room. The system employs about two hundred ultrasonic sensors and attaches an ultrasonic emitter to a wheel chair which an elderly person uses. The system tracks the emitter's position continuously and notifies caretakers when the wheel chair enters one of preser regions wliere accidenrs are likely to OCCUI.

James Geddes and Kevin Warwick in 2008 [3], uses GPS for Alzheimer's Patients is to give carers and families of those affected by Alzheimer's Disease, as well as all the other dementia related conditions, a service that can, via SMS text message, notify them should their loved one leave their home. Through a custom website, it enables the carer to remotely manage a contour boundary that is specifically assigned to the patient as well as the telephone numbers of the carers. The technique makes liberal use of such as Google Maps.

Constantinos Patsakis Distributed Systems Group, School of Computer Science and Statistics, Trinity College, Dublin in 2013 [4] ,enabled us to improve the quality of our lives, increasing the life expectancy as well, in almost every developed country. Therefore, a big part of the population, has reached older age. As a result, mild cognitive impairment and several types of dementia, are becoming a serious problem. Apart from medical care solutions, others are proposing modern technology based solutions. Patients are using geolocation devices, allowing tracing in case they have an accident, get lost or simply disoriented. Nevertheless, in the first stages cognitive impairment is not so dangerous, so patients
have a high degree of autonomy. Forcing them to carry such devices, surely invades their privacy.

Robert P. O'Brien, Srinivas Katkoori, and Meredeth A. Rowe in 2015 [5], introduces a system of embedded devices is presented which tracks a solitary dementia patient in the home in real-time. The system is composed of three main hardware components. Multiple passive and active sensors are strategically placed to monitor the patient. A number of custom battery-powered embedded systems read the sensors and wirelessly transmit the sensor's values. A central computational node collects the wireless transmissions and analyzes the data. Two algorithms were developed that detect the patient's eating activities and location throughout the home from the sensor data.

Lars Meinel , Julia Richter , René Schmidt , Michel Findeisen , Gangolf Hirtz in 2015 [6], introduces One promising remedy for the crisis in elderly care are novel consumer healthcare systems such as support systems for people with special demands. In this paper we present a novel assistance and information system for elderly people suffering from dementia. The system aims to support both the patient as well as the medical professionals, care personnel and informal caregivers. The system is designed to detect daily activities and to use the collected data for assistance.

Sr. no	Name of Paper	Methodology used	Limitation
01.	K.Doughty,G.Williams,P.J.King, R.Woods``Diana-A Telecare system for supporting Dementia Sufferes in the community",20th Annual International Conference of IEEE Engineering in Medicine and Biology society,Volume 20,1998.	DIANA and second generaton telecare system	Psychologist is needed continuously.
02.	Toshio Hori,Yoshifumi Nishida,Hiroshi Aizawa and Hiroshi Mizoguchi "Distributed Sensor Network for a Home for the Aged", International Conference on systems,2004.	Ultrasonic sensors	Ultrasonic sensor can provide position information but we cant know what he is doing.
03	James Geddes and Kevin arwick "cloud based global positioning system as a safety monitor for dementia patients"School of system engineering,university of reading,RG66AY,UK.	Cloud based global positioning system	Whole program will pause while the wait was completed
04	Constantinos Patsakis" A cryptographic approach for monitoring patients with mild cognitive impairment and dementia" Distributed Systems Group, School of Computer Science and Statistics, Trinity College, Dublin in 2013.	Cryptographic primitives and GPS mechnism	Used only for mild cognitive impairment and dementia.
05	Robert P. O'Brien, Srinivas Katkoori, and Meredeth A. Rowe" Design and Implementation of an Embedded System for Monitoring At-home Solitary Alzheimer's Patients" CSE Department, College of Engineering, Caregiving Lab, College of NursingUniversity of South Florida.	System of embedded device and active and passive sensors	Each mechanism of system are independent of each other.

06	Lars Meinel , Julia Richter , René Schmidt , Michel Findeisen , Gangolf Hirtz" OPDEMIVA: An Integrated Assistance and Information System for Elderly With Dementia	Ambient Assisted Living Technology	Systemis not utilizes RGB-D sensors and visual behavior analysis for the purpose of ADL monitoring.

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