RESEARCH ARTICLE

TRACKING OF PATIENTS WITH DEMENTIA USING WIRELESS SENSOR NETWORK.

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Manuscript Info	*Abstract*
	As an ascendancy of the aging of the world population, society and governments must confront big challenges regarding people's health. In early years, researches have been interested in investigating how the technology can be used to amend the healthcare and assistance of patients with dementia, as the Alzheimer's disease. In this paper, we propose an un-intrusive comprehensive model to help patients with dementia, based on the utilization of a wireless sensor network. Using high accessibility and cheap 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 location without superintendence.

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 [1]. Alzheimer`s disease and other forms of dementia are characterized by the loss of one's memory and cognition. Patients with this condition undergo quick mood swings and often stray away from their homes without being aware of it, creating difficulty to the care takers in locating the patient. 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].

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. Alzheimer's disease is the most general form of the Dementia family of illnesses. Unfortunately it is both incurable and terminal. Alzheimer's 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 true age. [5]. This leads to serious confusion and many of the 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 ex 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, these 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 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].

Proposed work:-

The proposed system employs GPS-GSM technology to track the location of dementia patient and also to communicate them with guiding system using voice. The GPS module is used to extract the location by linking itself to the constellation satellite, thereby facilitating this technology for outdoor tracking. Using this technology any device with a GPS receiver can give the accurate location from the latitude and longitude values. The GSM modem is used for global range wireless communication and connects the users through the subscriber identity module with the mobile equipment to any remote area.

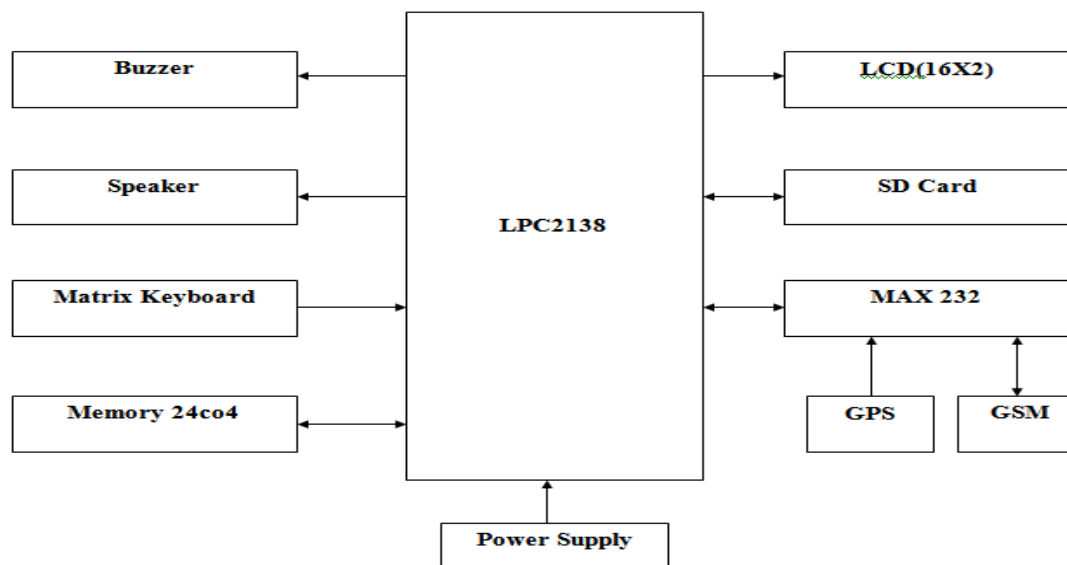The following figure 1 gives the detailed block diagram of proposed system.

Fig.1. Block diagram of the System.

ARM Controller:-

In ARM core we are using ARM7 processor and LPC 2138 controller for our project. As it has 60MHz clock operation so that its operation is fast. Also it is easily available and it is cheaper than LPC2148. We are not using LPC 2106 and LPC 2129 because of memory restriction and speed. Also for future enhancement of the project LPC2138 is useful. Also coding in LPC 2138 is compatible with LPC 2148. Due to this reasons we are using the LPC 2138 controller for our project.

GPS receiver:-

The hardware interfaces for GPS units are designed to meet NMEA requirements. The GPS receiver provides data in NMEA 0183format with a 1Hz update rate. Generally message received by GPS is in NMEA [National Marine Electronics Association] message format and NMEA protocol which is most commonly used is NMEA0183 protocol.

GSM hardware:-

The core of data communication about this system lies in wireless communication control terminals that uses GSM Modules to transfer long-distance data extensively and reliably. It Support instructions of AT commands.SIM300 can be integrated with a wide range of applications. SIM300 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS1900 MHz SIM300 provides GPRS multi-slot class 10 capabilities and support the GPRS coding schemes CS-1, CS-2, CS-3 and CS- 4. With a tiny configuration of 40mm x 33mm x 2.85 mm, SIM300 can fit almost all the space requirement in our application. Therefore, the MCU can connect with GSM modules very expediently through serial interfaces.

Matrix keyboard:-

Construction of a keypad is really simple. As per the outline shown in the figure below we have four rows and four columns. In between each overlapping row and column line there is a key. So keeping this outline we can construct

a keypad using simple SPST Switches as shown below figure 2, now our keypad is ready, all we have to do is connect the rows and columns to a port of microcontroller and program the controller to read the input.
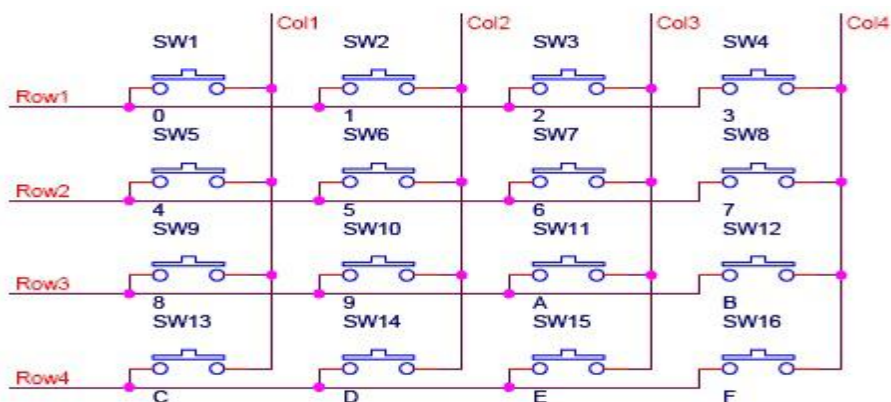

Fig.2. Matrix keyboard.

Results:-

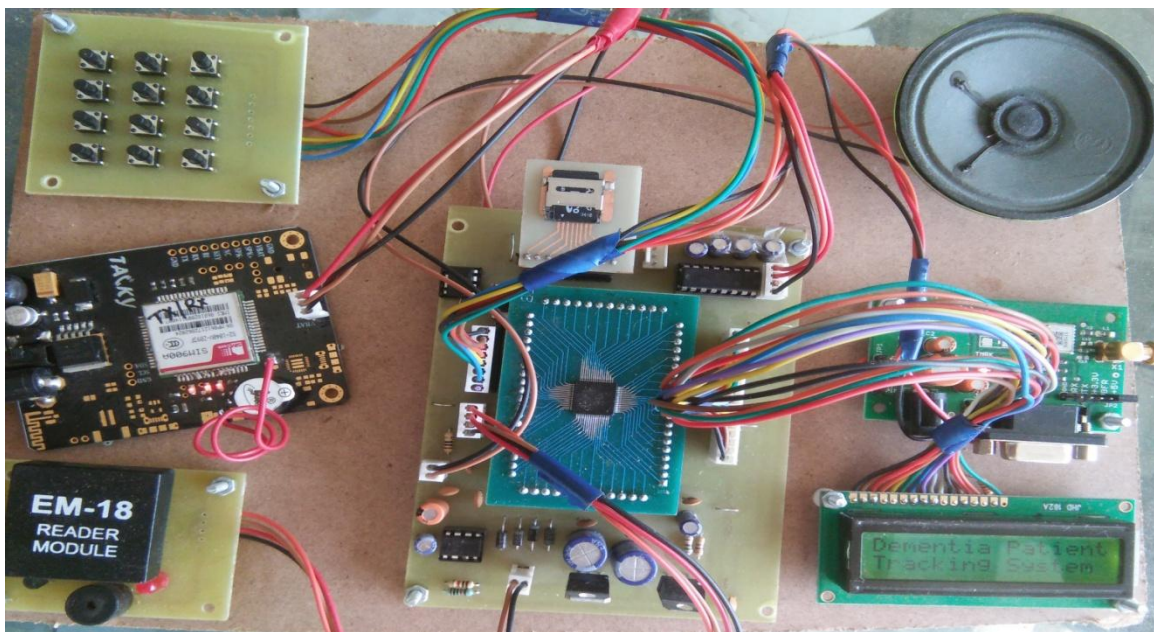a. The figure.3 gives the designed system and interfacing of ARM with the GSM, GPS, RFID card, keypad and LCD.

Fig.3. Designed system.

b. In the following figure 4 the caretaker can record the places by using keypad. He can also record the place according to the daily rout of dementia patient.
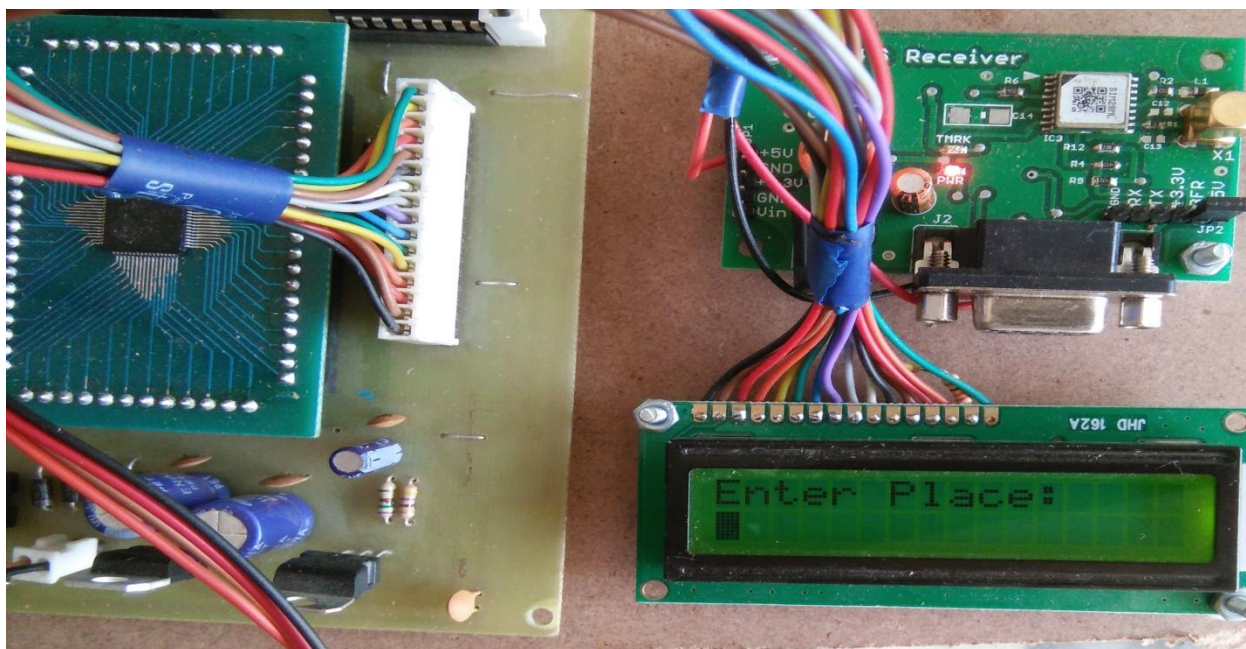
Fig.4. Recording of Places.

c.   For the continue location tracking we designed the map by using C-sharp. The map gets update automatically after every 2 minutes. This is done by the using RFID card. The figure 5 gives the map location.
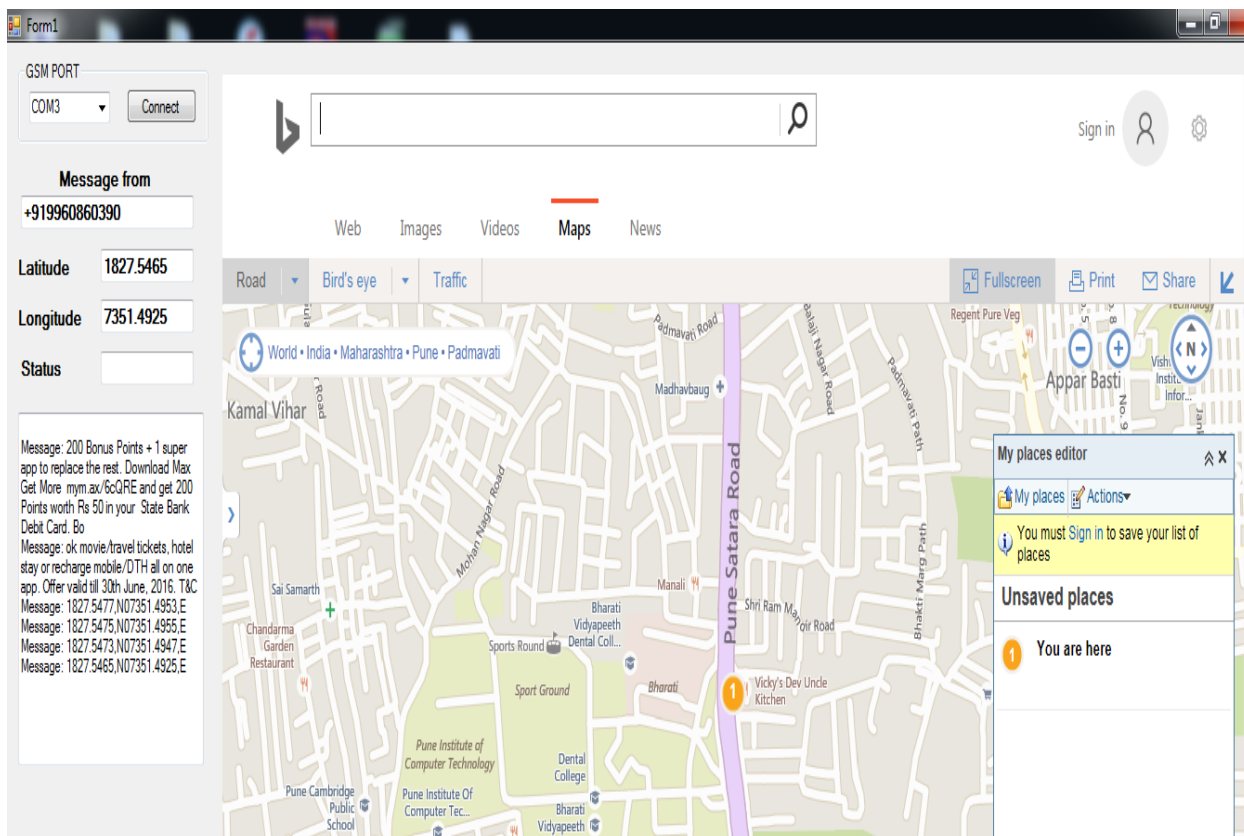

Fig.5. Map tracking.

Conclusions:-

This project has shown the ability of technology to help in the care for the elderly who are affected by dementia, in particular enabling them to stay at home on the basis of them being tracked / monitored with an alarm sounding when they traverse certain limits. It has also investigated how the innovative use of existing technologies can benefit those in need, without necessarily requiring excessive financial resources. It has also provided a valuable insight into designing human computer interfaces for different audiences; the website is designed for an IT capable audience, whereas the mobile device program is designed for an audience that is quite possibly incapable of understanding the concept of a computer.

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