# "Dementia will not make you forget the home" –Aurdino Healthcare Tracker for Insane Patients

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***Abstract***— while strolling among the population having disabilities like dementia is enormously insecure and it can lead to unusually awful and obnoxious for the family. The sufferers of dementia wander off without remembering knowing their path to their destination and may face a risk of getting misplaced, injured or damaged from numberless sentiments. In order to avoid these issues to the best of possibility, we will **congregate** a device that we name as 'Dementia will not make you forget the home'- Aurdino healthcare Tracker for insane patients, that may spot the position of the user wearing the gadget and once the patient will move out from pre outlined vicinity, an instantaneous missive will be sent to the care taker, whose cellular digits are fed in the gadget. The tracker will correspondingly have a compass that will be applied to indicate the user towards home, Aurdino as a microcontroller will be used in the tracker, a GPS module, a GSM module, and a compass. The microcontroller will be particularized to command the GSM module, GPS module and the compass. Deploying this device, the category of the user would be placid, that their family is concerned.

***Index Terms*— Aurdino Tracker, Dementia, Strolling**

## I. INTRODUCTION

### 1.1 Healthcare

The day to day advancements in telecommunication technologies has improved the health care system (HCS). Health care system is an important necessity of life. In the past, it was thought as an alternate field from gadgets and data innovation (IT). Presently extraordinary fields are combined to produce the beneficial and efficient artifact. Telemedicine is one of these fields. It is subdivision of Biomedical Engineering and a combination of telecommunication and medicine. Telemedicine is long-distance clinical health care, which includes sharing of medical information from Internet technology such as audio-video conferencing, monitoring of multiple patients simultaneously using computers or tracking a wandering patient using GPS[1].

Advances in healthcare field are working to prolong life and because of it elderly humans have increased. According to the survey by the Center for American Progress, there were 34 million elderly Americans in 2007 and this number is predicted to rise to 80 million by 2050 [2]. In Europe, it is predicted that people over 65 will make up one-third of the population by 2050 [3].

It can become very difficult for a caretaker to look after a dementia patient 24/7. The privacy of patient may be compromised because of it the person may more subject to others. With a specific end goal to assess different approaches to enhance the lives of elderly patients, tracking utilities are used, like those used for tracking vehicles and courier parcels. Tracking devices have been introduced for dementia patients [4]. Due to which the attendant may not need to monitor the patient continuously and several patients can be monitored at the same time by using computers. In case of an emergency or an accident, systems have been developed to alert the relevant person.

### 1.2 Alzheimer's disease - a type of Dementia

Dementia is a term used to define loss in brain activity that affects the patient's daily life [5]. Intellectual abilities, mental deterioration and memory loss are the result of it. Thinking capabilities of the patient of this disease are lost and they lose control of their daily routine activities. By the time the caretakers figure out the cause of these problems, major parts of the brain might have already been affected by dementia. Other than aging, dementia can also be caused by injuries to the head, or it can be genetic.

Alzheimer's is a type of dementia in which the patient's mental capacity deteriorates as brain cells get damaged and do not repair accordingly [6]. The most widely recognized and noticeable indications incorporate memory misfortune, trouble in everyday life routine assignments, loss of ability to know east

from west, and meandering. The patient might walk repeatedly around the house, or get up and leave the house at any time.

People with Alzheimer's often experience disorientation, which causes them difficulties in finding their way home. This can make their caretaker feel very anxious and concerned for the patient's safety, and it is necessary to constantly monitor them. A tracking device plays a crucial role in the well-being of these patients and is a successful solution for Alzheimer's patients who need the attention of a caretaker twenty-four hours a day.

**1.2.1 Symptoms**

The effects of this illness are for the most part moderate; however, they deteriorate after some time and begin to meddle with everyday life. [7]

There are a few normal manifestations of this disease, yet it is important to remember that every sufferer of this disease would be one of a kind. Two people suffering with this illness are probably do not get the cure in the same pattern.

For a considerable number of individuals with Alzheimer's, the early symptoms are memory loss. They may encounter issues auditing late events and adjusting new information. These indications tell us that the early harm in Alzheimer's is more often than not, to a part of the mind, called the hippocampus, which has an important part in everyday memory.

Memory trouble because of Alzheimer's infection gradually interferes with the person's daily life as the illness progresses.

The individual may:

- misplace things (e.g. glasses, keys)
- battle to find the correct word in a conversation or overlook somebody's name
- disregard late discussions or occasions
- become mixed up in a commonplace place or on a well-known adventure
- disregard arrangements or commemorations. [8]

Besides the truth that memory troubles are generally the soonest damage caused by this illness, somebody with the illness will continue to face degradation and problems in different mental processes such as decision making, communication, following the other persons/object etc. They may experience issues with:

- dialect – attempting to take after a discussion or rehashing themselves
- visuospatial abilities – issues judging separation or seeing articles in three measurements; exploring stairs or stopping the auto turn out to be much harder
- focusing, arranging or sorting out – challenges deciding, tackling issues or doing a grouping of undertakings (e.g. cooking a dinner)
- introduction – getting to be distinctly befuddled or forgetting about the day or date.

A man in the prior phases of Alzheimer's will regularly have changes in their state of mind. They may get to be distinctly on edge, bad tempered or discouraged. Many individuals get pulled back and lose enthusiasm for exercises and side interests. [9]

**1.2.2 Later Stages**

As Alzheimer's advances, issues with memory setback, correspondence, intuition and acquaintance turn out to be more extreme. The individual will require more support from the people who care for them.

A few people start experiencing to hear untrue voices or see things/events which are not in real (imagination).

Many individuals with Alzheimer's likewise create practices that appear to be unordinary or abnormal. These incorporate tumult (e.g. eagerness or pacing), getting out, rehashing a similar question, exasperates rest designs or responding forcefully. Such practices can troublesome for the individual and their carer. They may require isolated treatment and administration to memory issues. [10]

In the later periods of Alzheimer's sickness some person may end up being significantly less aware of what is happening around them. They may encounter issues eating or walking around help, and end up being dynamically delicate. Over the long haul, the individual will require help with all their ordinary activities.

How rapidly Alzheimer's sickness advances, and the future of somebody with it, differs enormously from person to person. Everything happening during this infection live about one decade after the initial side effects. In any case, this varies considering what the

age of the patient was at the point when they got effected by Alzheimer's.

### 1.2.3 Treating dementia vs. treating Alzheimer

Treatment for dementia will rely upon the correct cause and sort of dementia; however numerous medicines for dementia and Alzheimer's will cover.

Alzheimer's treatment:

No cure for Alzheimer's is accessible, yet choices to oversee side effects of the ailment include:

- drugs for behavioural changes, for example, antipsychotics
- drugs for memory misfortune, which incorporate cholinesterase inhibitors donepezil (Aricept) and rivastigmine (Exelon) and memantine (Namenda)
- elective cures that plan to support mind capacity or general wellbeing, for example, coconut oil or fish oil
- drugs for rest changes
- drugs for gloom

Dementia treatment:

Now and again, treating the condition that causes dementia may aid.

Conditions well on the way to react to treatment incorporate dementia due to:

- drugs
- tumors
- metabolic disarranges
- hypoglycemia

As a rule, dementia isn't reversible. Be that as it may, many structures are treatable. The correct prescription can oversee dementia. Medications for dementia will rely upon the cause.

For instance, specialists frequently treat dementia brought on by Parkinson's ailment and LBD with cholinesterase inhibitors that they regularly use to treat Alzheimer's, [11]

Treatment for vascular dementia will concentrate on anticipating further harm to the cerebrum's veins and counteracting stroke.

Individuals with dementia can likewise profit by strong administrations from home wellbeing associates and different parental figures. A helped living office or nursing home might be important as the sickness advances. [12]

### 1.2.4 Atypical Alzheimer Disease

In a few people with Alzheimer's malady the most punctual side effects are not memory misfortune. This is called atypical Alzheimer's sickness. The basic effect (plaques and tangles) will not change; still the part of the brain to be swayed will not be the hippocampus.

These diseases tend to be more problematic when the patient is more than sixty-five years. It is, be that as it may, more normal in individuals analysed when they are under 65 (early-onset Alzheimer's sickness). In this age, collective, it occurs to up to 33% of the cases.

The infections in this type of disorder are listed below:

Back cortical decay (PCA) is diagnosed when the back and upper back parts of the brain are harmed. These are zones that procedure visual data and manage spatial mindfulness. This implies the early side effects of PCA are regularly issues recognizing articles or perusing, regardless of the possibility that the eyes are sound. Somebody may likewise battle to judge separations while going down stairs, or appear to be ungraceful (for instance when dressing).

Logopenic aphasia may cause damage to the cerebral (left half) and this causes dialect. The individual's discourse gets to be distinctly toiled with long delays.

Frontal variation illness type causes damage to the cerebrum (front and flap). The side effects are issues with arranging and basic leadership. The individual may likewise act in socially unseemly ways or appear not to think about the sentiments of others. [13]

### 1.2.5 Who gets Alzheimer?

Considerable number of individuals who develop Alzheimer's sickness do in that capacity after the age of 65, however people under this age can in like manner make it. This is called early-onset Alzheimer's contamination, a kind of young onset dementia. In the UK, there are more than 40,000 people under 65 years of age with dementia. [14]

Developing Alzheimer's ailment is associated with a blend of components, cleared up in more detail underneath. Some of these peril components (e.g. lifestyle) can be controlled, in any case others (e.g. age and qualities) can't.

Age:

Age is the most serious hazard figure for Alzheimer's. The illness predominantly influences individuals more than 65. Over this age, a man's danger of building up Alzheimer's illness copies around like clockwork. One in six individuals more than 80 have dementia.

Sex:

For reasons that are not clear, there are about twice the same number of ladies as men more than 65 with Alzheimer's illness. This distinction is not completely clarified by the way that ladies all things considered to have longer life as compared to men. The cause may be that this disease in ladies is associated to the hormone oestrogen after the menopause.

Hereditary legacy:

Many individuals expect that the malady might be passed down to them from a parent or grandparent. Researchers are exploring the hereditary foundation to Alzheimer's. There are a couple of families with an unmistakable legacy of Alzheimer's starting with one era then onto the next. In such families, the dementia has a tendency to grow well before age 65, [15]. Be that as it may, Alzheimer's illness that is so unequivocally acquired is amazingly uncommon.

In by far most of individuals, the impact of hereditary qualities on danger of Alzheimer's sickness is a great deal more unpretentious. Various qualities are known to increment or lessen a man's odds of creating Alzheimer's. If someone's nearby relative (parent or kin) is diagnosed to have Alzheimer's when crossed the age of 65, [16], the chances of such people to get infected by this illness are obviously increased. But it cannot be said that other people are immune from this disease Individuals with Down's disorder are at specific danger of building up Alzheimer's infection, on account of a distinction in their hereditary cosmetics.

Wellbeing and way of life:

Medicinal conditions e.g. heart issues, diabetes, stroke, and in addition hypertension, elevated cholesterol and corpulence in midlife, are altogether known to expand the danger of both Alzheimer's illness and vascular dementia. Anybody can decrease their hazard by monitoring these. Melancholy is a likely hazard figure for dementia; getting it treated early is critical.

People who are willing to spend quality life with this disease especially from the midlife onwards, are more antagonistic to develop this sickness. This implies taking customary physical practice and keeping to a sound weight, not smoking, eating a solid adjusted eating regimen and drinking just with some restraint.

Driving a dynamic way of life that consolidates normal physical, social and mental action will bring down hazard. [17]

### 1.3 Hardware Description

All in all, any gadget is intended for a specific reason, framed through incorporating distinctive electronic parts. The objective was to plan a gadget that could track the patient with dementia. Hardware of this gadget is extremely basic as less segments have been utilized to build the gadget. The essential parts of the gadget incorporate the Compass, GPS and GSM modules with Arduino.

#### 1.3.1 GSM Module (Sim900a)

GSM is a versatile correspondence modem; it stands for worldwide framework for portable correspondence (GSM). The possibility of GSM was created at Bell Laboratories in 1970. It is generally utilized portable correspondence framework as a part of the world. GSM is an open and advanced cell innovation utilized for transmitting versatile voice and information administrations works at the 850MHz, 900MHz, 1800MHz and 1900MHz recurrence groups.

GSM framework was produced as a computerized framework utilizing time division multiple access (TDMA) procedure for correspondence reason. A GSM digitizes and diminishes the data, then sends it down through a channel with two unmistakable surges of client data, each in its own particular timetable opening. The mechanized structure has an ability to pass on 64 kbps to 120 Mbps of data rate.

There are different cell sizes in a GSM framework, for example, full scale, miniaturized scale, pico and umbrella cells. Every cell shifts according to the execution space. There are five distinctive cell sizes in a GSM organize large scale, miniaturized scale, pico and umbrella cells. The scope region of every cell fluctuates as per the usage environment, [18]

**1.3.2 GPS Module (Ublox neo-6m)**

This is a gadget that is fit for accepting data from GPS satellites and afterward to precisely figure its geographical area.

GPS was originally expected for military applications, yet in the 1980s, the administration made the structure reachable for non-military personnel utilize. GPS works in any environment settings, anyplace on the planet, 24 hours a day. There are no membership expenses or setup charges to use GPS.

The satellites circle the earth two times a day in an uncommonly correct circle and transmit hail information to earth. GPS recipients take this information and use trilateration to register the user's right region. Fundamentally, the GPS receiver takes a gander at the time a banner was pass on by a satellite with the time it was acquired. The time refinement tells the GPS authority how far away the satellite is. In no time, with detachment estimations from a few more satellites, the authority can choose the customer's position and show it on the unit's electronic guide.

A GPS collector must be attached on to the flag of at least 3 satellites to establish a 2-D location (scope and longitude) and track development. With at least four satellites in view, the receiver can decide the client's 3-D position (altitude, longitude and height). Once the user's position has been determined, the GPS unit can determine other data, e.g., track bearing, speed, trip distinct, distance to goal, time etc.

Today's GPS authorities have a very high accuracy. 12 station gatherers catch satellite signals when it is turned on and they keep up strong locks. Certain ecological parts can impact the exactness of GPS recipients. Garmin GPS receivers are correct to inside 15 meters, in light of current circumstances.

More up to date Garmin GPS recipients with WAAS (Wide Area Augmentation System) ability can enhance precision to less than 3 meters by and large. No extra hardware or charges are required to exploit WAAS. Clients can likewise show signs of improved accuracy with Differential GPS (DGPS), which redresses GPS to an accuracy of 3 to 5 meters. The U.S. Drift Guard works the most well-known DGPS amendment benefit. This framework comprises of a system of towers that get GPS flags and transmit a remedied motion by reference point transmitters. Keeping in mind the end goal to get the redressed flag, clients must have a differential reference point collector and signal reception apparatus notwithstanding their GPS, [18].

**1.3.3 Compass Module (HMC5883L)**

The Compass Module is intended for low-field attractive detecting with a computerized interface, to give making a beeline for your microcontroller extend. This conservative sensor fits into little ventures, for example, UAVs and robot route frameworks.

The sensor changes over any attractive field to a differential voltage yield on 3 tomahawks. This voltage move is the crude computerized yield esteem, which can then be utilized to ascertain headings or sense attractive fields originating from various bearings. Case code in PBASIC, Spin, and C are given beneath.

Key Features:

- Measures Earth's attractive fields
- Accuracy in-hub affectability and linearity
- Intended for use with a substantial assortment of microcontrollers with various voltage necessities, [19]

**1.3.4 Arduino (UNO & Pro Mini 3.3v)**

Arduino is an electronic device and an easy to use open source software platform based on. - And turn it into a production - - A button with a finger on a light sensor or a message on Twitter, an engine, a LED activity, are able to read a number of online publications Arduino last entry. A set of instructions that can tell you what to do by sending microcontroller board for your dish. To do this, Arduino programming language (based on Wiring) and the Arduino software (IDE), the change is based.

Over the years thousands of projects of everyday objects Arduino is the brain of complex scientific instruments. Students, hobbyists, artists, programmers and professionals - - a global community of the creators of the open source platform is round, their contributions available for beginners and advanced can be a great help to have added an incredible amount of knowledge.

A basic instrument for quick prototyping went for understudies without a foundation in gadgets and Arduino programming, Interaction Design Institute

Ivrea was conceived. When you have a more extensive group, Arduino, IoT applications, versatile printing, 3D territory, and 8-bit modify implanted frameworks with a basic item to the new necessities and difficulties for the split started to change its offer. All Arduino sheets are totally open source, to be free lastly adjusted to your particular needs, permitting clients. The product is open source and becomes through the commitments of clients around the globe.

Arduino Pro Mini is a surface mount unit is coordinated with incorporated USB. This is a little, total, and breadboard benevolent. This all Diecimila / Duemilanove (power) and more consistent investment pin and a bridge Arif on board with a 5-V is. Physically, the outlet is missing. Pro Mini automatically detects and switches to the energy of the high potential source of energy for the selection of the gap are not a need.

So that more space on board the Pro Mini, a smaller footprint than with the ability to breadboard Boarduino and mini-USB. Pin that a design (one top, power and the other on the ground TX, RX, ATN, GND) or the Basic Stamp with mini works well. This new version 3.0 ATmega328 more memory space and data programming comes with the offer. There are two layers. This is the reason that it is easier and more economical to hack to make. [20]

Arduino projects have been used in thousands of applications. For beginners, Arduino software for advanced users and easy to use, yet flexible enough. Mac, Windows and Linux runs. The teachers and students to test students or programming and use it to build low-cost scientific equipment, chemistry and physics principles start with robotics. Interactive designers and architects prototypes, facilities and construction of musicians and artists experiment with new instruments. Manufacturers, of course, is, producer of many projects, for example, use when they are not shown. Is an important tool to learn new things Arduino? No follow - children, amateurs and artists, programmers - can start retouching to share ideas with other online members of a cut, or step-by-step instructions for the Arduino community.

There are numerous different microcontrollers and microcontroller stages accessible for physical registering. Parallax Basic Stamp, NETMEDIA BX-24, Phidgets, MIT Handy Board, and numerous others offer similar components. Every one of these gadgets microcontroller programming bundles wrapped in filthy data and a simple to utilize. Arduino microcontrollers additionally, yet instructors, understudies and intrigued novices over different frameworks rearrange the way toward working with many favorable circumstances:

- Inexpensive - Arduino are generally modest contrasted with other microcontroller stages. The minimum costly rendition of the Arduino module can be collected by hand, and even pre-gathered Arduino modules cost not exactly $ 50
- Multiplatform - Arduino programming (IDE) for Windows, Macintosh OS X and Linux working framework keeps running on. Most microcontroller frameworks are restricted to Windows.
- Simple, clear programming environment - Arduino programming (IDE), the primary simple to utilize, yet sufficiently adaptable to exploit the propelled clients to take. Educators who are just on the Processing programming environment, workplace, so understudies will be acquainted with the program for the Arduino IDE to learn.
- Open and extensible programming code - as open source programming instruments for the expansion by experienced developers accessible Arduino. Dialect C ++ libraries can be extended by method for, and the specialized learning AVR C programming dialect in view of what individuals need to comprehend, you can make the jump from Arduino. Likewise, AVR-C code straightforwardly into your Arduino programs in the event that you need to include.
- Open source and extensible equipment - Arduino board arrangements are distributed under a Creative Commons permit, so experienced fashioners, circuit modules, development and change can make your own particular variant. Indeed, even those with little experience to see how to profit and the board module adaptation can deliver shop works, [21]

### 1.3.5 LED DISPLAY (OLED display)

An organic light-emitting diode (OLED) is a light-emitting diode (LED) in which the emissive electroluminescent layer is a film of natural aggravate that transmits light in light of an electric

current. This layer of natural semiconductor is arranged between two anodes; normally, no less than one of these terminals is straightforward. OLEDs are utilized to make computerized shows in gadgets, [22]

### 1.3.6 XBee Module (1mW)

XBee is the brand name of a gathering of shape segment consummate radio modules. The XBee radios can all be used with the base number of affiliations — control (3.3 V), ground, data in and data out (UART), with other recommended lines being Reset and Sleep. [23] Additionally, most XBee families have some other stream control, input/yield (I/O), easy to-modernized converter (A/D) and marker lines worked in. A version called the programmable XBee has an additional on-board processor for customer's code. [23]

### 1.3.7 Xbee Shield

The XBee Shield gives your Arduino a consistent interface to XBee – a standout amongst the most prevalent remote stages around. With XBee, rather than being secured by a serial link – inches far from a combined gadget – your Arduino can disregard information the air to another gadget many feet away, [24]

### 1.3.8 Li-Battery

We used three li-batteries as source of power for the circuit, it is rechargeable. Two batteries are connected to the pocket part and one is connected to the hand part.

### 1.3.9 Buck-boost converter

We used buck boost converter to convert the low voltage to higher. The buck–boost converter is a kind of DC-to-DC converter that has a yield voltage greatness that is either more noteworthy than or not exactly the information voltage extent. It is equal to a fly back converter utilizing a solitary inductor rather than a transformer. [25]

## II. METHODOLOGY

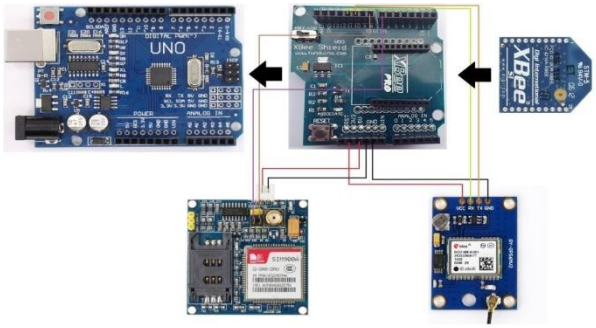
This project has two parts:

### 2.1 The Pocket Part

The pocket part consists of Arduino Uno, Xbee 1mW with Xbee shield, GPS module (uBlox Neo-6m) and a GSM module (Sim900a). The main controller in this part is the Arduino Uno. The Xbee, GPS and GSM modules are all controlled by the Arduino Uno. The Xbee 1mW is mounted on top of the Xbee shield which in turn is mounted onto the Arduino Uno. The Arduino Uno works on a 5V logic while the Xbee works on a 3.3V logic; the Xbee shield is used which interfaces the Xbee with the Arduino Uno and converts the 5V logic to a 3.3V logic. The XBees communicate over serial port i.e. serial communication, in AT mode. AT mode is synonymous with "Transparent" mode. In AT mode, the data from the Arduino Uno is sent through one XBee module and is received by the other Xbee in the wrist watch part.

UBlox Neo-6m is the GPS module that is used in this project. The RX (receive) pin of the GPS module is connected to the D11 pin of the Arduino Uno and the TX (transmit) pin is connected to the D10 pin of the Arduino. We have established a software serial port to communicate with the GPS module and using this we can send and receive data from the GPS module and using this we can determine our current latitude and longitude.

Figure 2-1




We use our current coordinates to calculate the distance from our current location to the fixed location, which is pre-defined according to the location that the user specifies as the center point for this device e.g. his home. The GPS data is wirelessly sent to the wrist watch part with the help of the XBee used in this part of the project.

Sim 900a is the GSM module that we have used in our project. The RX pin of the GSM module is connected to the D8 pin of the Arduino and the TX pin to the D7 pin. A software serial is also

established, like the one used for the GPS module, but instead D7 and D8 pins are used. This module is used for the caretaker so that if the user or dementia patient exits the set parameter around the fixed location / coordinates, the caretaker will immediately receive a warning message telling him/her that the patient has left their home, and has started wandering. The exact location of the patient will also be sent with the help of a google maps link that will pin point the patient's location.

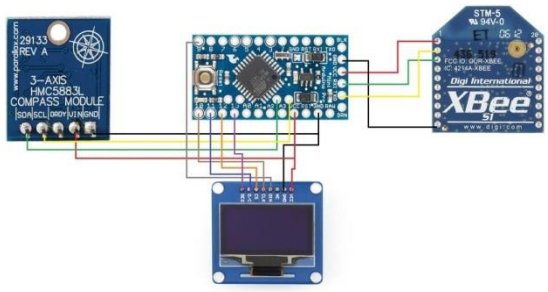
**2.2 The Wrist Watch Part**

The wrist watch part consists of Arduino Pro Mini 3.3V, Xbee 1mW with breakout board, Compass module (hmc5883l) and 1.3" OLED display.

In this part the Arduino Pro Mini is the main controller and it works on a 3.3V logic and it will control the Xbee, compass module and the OLED display.

The Xbee used in this part is not mounted using a Xbee shield because the Arduino Pro Mini already works on a 3.3V logic. The pin spacing between the Xbee module's pins is about 2mm which is very small, and it cannot be mounted onto a solderless breadboard and normal jumper wires cannot be used with the Xbee in this state. A breakout board is used to solve this problem. The Xbee 1mW is mounted onto a breakout board which increases the pin spacing to 0.1" (inch) and now jumper wires or breadboards can be used for the interfacing of the Xbee with the Arduino. The $D_{OUT}$ pin of the Xbee is connected to the RXI pin of the Arduino Pro Mini and the $D_{IN}$ pin is connected to the TXO pin of the Arduino.

Figure 2-2




The compass module used in this project is hmc5883l which is interfaced with the Arduino Pro Mini using $I^2C$ communication protocol and the SCL (clock line) pin of the compass module is connected to the A5 pin of the Arduino and the SDA (data line) pin of the module is connected to the A4 pin of the Arduino. This module is used to give us our current direction in which we are headed. The GPS data sent by the Xbee of the pocket part is received by the Xbee of this part and this data is used to calculate the direction to our fixed location. Like the GPS, this part also has a fixed direction and a current moving direction. When both the values are equal, we will be facing towards our fixed location.

The OLED display is the part that shows us a digital compass, showing us our current direction and the direction to the fixed location. The display also shows the numeric value of the two directions in degrees with a precision of 1° and it also shows the distance to our fixed location in meters with a precision of 1m.

## III. RESULTS AND DISCUSSION

In the pocket part, we have two GPS coordinates: the first ones are our current GPS coordinates which the GPS module constantly updates after a specific interval, and the second ones are the user specified fixed coordinates. We use both coordinates and calculate the distance between them and then using this distance, we have set a range or a parameter of 50 meters; if the patient steps out or leaves this parameter, i.e. his distance from the fixed coordinates exceeds 50 meters, the caretaker of the patient will start receiving a text message, with the help of the GSM module in this part.

The text message will indicate that the patient has started wandering, and the patient's exact location will be sent, with the help of a google maps link, which when opened will open the application and the exact location of the patient will be known. The text message will also include the distance of the patient from the fixed location or waypoint. The caretaker will constantly receive the text messages after every 2 seconds and will only stop once the patient has been brought back within the fixed parameter. The figure below shows the text message that the caretaker will receive.

Figure 3-1


The wrist watch part of the project is connected to an OLED display whose display is shown in the figure below. The watch part of the project uses the GPS data sent wirelessly from the pocket part to calculate the direction from our current location to our fixed location. Then using this data, a digital compass is drawn on the display which tells the patient, which direction he/she is supposed to go.

Next to the compass are three numerical representations of the calculated data. The top 140° are the directions to our fixed location, the middle 67m tells us the distance to our fixed point in meters, and the bottom 258° tells us our current direction, which will constantly change as we rotate. When the top fixed angle and the bottom angle become equal, the lines on the compass will also align, indicating that we are now currently headed in the direction of our fixed location.

Figure 3-2


Like any other device in its development phase, this device has its fair share of limitations. The most important is the limitation that GPS module imposes while starting the project. While working indoors, the GPS module must be placed near a window for it to connect with or detect the satellite signal. It takes less than five minutes for the GPS module to catch a satellite signal near the window. If the GPS module is not placed near a window, like in a room that is in the middle of a house, it may take more than thirty minutes for the GPS module to get a fix on the satellite signal.

When inserting a sim into the GSM module, the device must be turned off or it must be restarted after inserting it, for the sim to get a signal fix with the nearest signal tower, otherwise the GSM module will be of no use in case the patient starts wandering. In the programming of the pocket part of the project, the number of the caretaker must be specified, and that number cannot be changed unless the user has the programming of that part.

During the wireless communication between the two parts of the project, the data sent by the Xbee of the pocket part might not be received in the exact same order by the Xbee of the wrist part and that may cause random and incorrect readings to be displayed on the OLED on the wrist of the patient causing the patient to get confused, but the pocket part of the project works fine so the tracking part of the device remains unaffected.

## IV. CONCLUSION AND FUTURE WORK

Individuals with dementia will be unable to think all around ok to do typical exercises, for example, getting dressed or eating. They may lose their capacity to take care of issues or control their feelings. Their identities may change. They may get to be distinctly fomented or see things that are not there. Taking this disease side effect in mind we designed a simple gadget that will help in locating the position of the patient.

The gadget will likewise have a compass that will be utilized to manage the client back home, with their sought directions spared in the gadget. Utilizing this gadget, the group of the client would be tranquil, realizing that their cherished one is constantly represented.

The gadget is basic; be that as it may, a few changes are required to make it a perfect gadget for dementia understanding. The gadget is separated into two parts and it is anything but difficult to wear, however it can be made into one finished device by utilizing reduced and littler variant or miniaturized versions of the hardware used, for example, GSM, GPS and compass modules.

If the final device is combined into one, then the overall size and cost of the project will also be reduced. This is because if the two parts are combined into one, the use of Xbee module will not be needed for the wireless communication and thus

the overall number of hardware will also be reduced, and the cost will be reduced because the Xbee modules are very expensive pieces of hardware when compared to the other hardware used.

The device can also be used or interfaced with a smart phone application which can be used by utilizing the GPRS feature of the sim900a module. Using the application, the user can be given access to making changes to the device settings according to his need. Instead of predefining the caretakers number and the fixed parameter around the patient in the programming, the user can set these parameters according to his need and the patient's location can be constantly sent to the application like in google maps application and the caretaker can constantly monitor their location over the internet. Receiving the text message or not could also be selected in the application. Making these changes to the device can be make patient tracking very easy and accessible to everyone in need of such a device.

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