Université Jean Monnet
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Research Project Proposal
Smart Band for Alzheimer's Patient

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1 ABSTRACT

Alzheimer's is a chronic, incurable, degenerative disease that disrupts the daily life of a patient.The proposed system is a smart band which would be able to help an Alzheimer's patient with memory loss situation. Not only acting as a reminder of food-shower-medicine but also track-analyze the memory situation with the help of several data collected from the sensors like microphone, GPS, decent-lens-ed camera with flash, ZigBee. The collected data would be analyzed using the new features added to the cloud, every day. The main aim of this system is to create a working environment for patient at home, reduce health expenses and remove the dependency on a care taker.

2 KEY WORDS

Alzheimer; Android,IOS,Microsoft; Internet of Things IoT; Smart band; GPS; Reminder

3 INTRODUCTION

Alzheimer's accounts for 60 percent to 70 percent of cases of dementia. The word dementia involves memory loss,difficulties with thinking to solve problems and language. This disease facilitates the degeneration of neurons and gets worse over time. Early symptom are difficulty in remembering recent events which is designated as short-term memory loss. Alzheimer's disease, named after the doctor who first described it as Alois Alzheimer, which is a physical disease affecting the brain.It affects about 6 percent of people 65 years and older.

Patient suffers from various problems such as recollection of memory, inability to think, communicate, and make sound decision. They lose the track of their thoughts and not know what to speak. Behavioral symptoms such as depression, anxiety, sleep disorder also occurs as disease progresses. Changes in mood and personality, less social participation, distress from work; all these conditions drastically affect their life.

The proposed Smart Band would help to keep track of the progress of the patient's remaining capabilities and help to improve their overall quality of life. The focus of our work is to improve patient's condition with the safety smart band which would assist in their daily activities to promote independence and help on participation of social activities.

With this band, it would be helpful to track the patient at their home environment which would include, identifying whether the patient is in bedroom, kitchen, bathroom etc, This can be notified to the care taker(if there exists one) via the optimal notification on Threat Detecting Meter mobile app, compatible with IOS-Android-Microsoft, if the patient moved from one room to another and also it will tell the patient that he/she has moved to a particular room via the smart band retina display. The band can be used for finding abnormal activities such as patient not getting up even with sound-intensity-changing alarm then the camera-with-flash sensor touching the patient's skin would be able to detect the colour variation of the patient's blood stream, detect the anomaly in the pulse rate and notify the designated doctor.During this phase, a phone call would be triggered to the emergency contact if there's an absence of immediate care taker.

4 MOTIVATION

Thoughts toward the development of Smart Band 1) Allowing the patient to wanders off with confidence by supporting their memory. 2) Always tracking the patient and helping him/her patient with outside world activities. 3) Helping the patient to take medicines on time with reminder 4) In this world, where you're on your own, this device would help the patient to survive for as long as possible without dependency for his/her family

Alzheimer is the disease which affects the memory of a person. Alzheimer's, affecting people in their 30-40s, is known as early-onset (or younger-onset) Alzheimer disease.Many of them are in their 40s and 50s when the disease takes hold. According to recent studies conducted globally, women with dementia outnumber men 2 to 1. Brain scans tell us that the rate at which neurons are dying in the brain is faster in women than in men.Although women are more likely to live longer than men. However, although risk increases with age, dementia is caused by diseases of the brain not age alone. Alzheimer is an incurable disease.

I. Stages: There are 3 stages of Alzheimer

1) Initial Stage: In this stage, the person may function independently with a bit of memory loss. Patient might forget familiar words. Common problems are: • Difficulty in remembering names • Difficulty in performing social tasks •

Trouble in planning and organizing events

2) Second Stage: This stage condition lasts for many year among Alzheimer patient. Patient gets frustrated and angry, acting uncertain and refuses to do daily routine tasks. Common problems are: • Forgets personal history • Forgets to sleep • Get lost somewhere

3) Final Stage: This stage is considered to be worst stage where people forgets to breath and unfortunately dies. Patient requires extensive care. Common problems are: • Need full time assistance • Difficulty in communication • Suffers from infection

5 LITERATURE SURVEY

There are several research model already existing in the market in today's date which has provide help for the patient or a companion to the patient,but none of the existing model could eliminate the dependency on care taker.Below are the few details of existing models.

5.1 Alzheimer's Daily Companion:

Features:
• Free and immediate advice and tips.
• 24-hour care giving assistance via toll free phone number and email.
• Access to all tips and advice without internet.
Drawbacks:
• No GPS to solve wandering problem.
• Need constant support of human caretaker.
• Does not provide family details, reminder, schedule. Ref.[12].

5.2 Alzheimer Caregiver Buddy:

Features:
• Get instant caregiver help and advice.
• Access free help from the 24/7 Alzheimer's Association helpline
Drawbacks:
• No tracking of patient movement.
• Need caretaker constant support.Ref.[13]

5.3 Samsung Memory Recaller:

Features:
• Helps patient remember their personal details.
• Add photo using camera and add relationship.
• Takes photo instantly and compares with one in database and speak their name and relationship with patient.
Drawbacks:
• Camera need to be kept on state continuously.Ref[11]

5.4 AlzhiCare:

Features:
• Provides useful activities to keep patient alert.
Drawbacks:
• Reduces the burden on care taker, but dependency remains. Ref[8]

6 PROPOSED SYSTEM

Alzheimer has no medication available. As there is no medication for this disease, we can attempt to slow down the progress of Alzheimer by taking care of patient and reminding them of everything surrounding them including their own selves.It is impossible for the Care Taker to be with patient,all the time. So here we are presenting a solution for this problem by developing an "Platform Independent Smart Band for Alzheimer's Patient" which is basically an assisting application for Patient known as Safety monitoring App, running in the smart band. Our system will remove the dependency on care taker, and provides useful activities to keep patient alert, over a virtual reality headset-only if the patient choose to.

The goal for this app is to increase the patient's capabilities and improve their overall quality of life. The patient will not be in the active mode all the time and their potential capabilities would not stay good because the memory deteriorates over time.Safety Monitoring app would keep track of the patient 24X7. Safety Monitoring app captures every sound and voice command in the room. For privacy, we recommend disabling the mic by pressing the smart band's 'Mute' option when the care taker is with the patient to prevent care taker's data from being collected. An Alzheimer patient can never have the capability to use the mute option because an OTP would have to be entered by the designated care taker which he/she would be getting as an email notification. We would also like to mention that if something goes wrong with the patient during this point of time, then we would not take any responsibility.Our efforts go towards minimizing dependency of caretaker. The patient would not be able to visit a doctor for regular check-up, because of inability to make their way to the clinic or hospital. Hence our system at the cloud appoints a private ambulance to pick the patient from the GPS location and drop the patient to the designated doctor 15minutes before the appointment. With the use of zigbee in each room, the patient's exact location in the house, would always available online that can be accessed by the registered emergency contact and this private ambulance company people. We'd like to mention that our objective is not to make the life of the patient, a living hell, and hence such access to the patient data is available only during required situation. The patient would be dropped at the original pickup location, after the appointment. The pickup time by the private ambulance is calculated based on the google map data for distance between the two locations. The pickup time calculation starts at 00:00 hours and would be modified based on the GPS location.Our data helps the doctor

to keep track of the progress of the patient by accessing the portal containing the data. The band data also contains normal and abnormal pulse rate details which is calculated with help of the camera-with-flash sensor, present at the back side touching the patient's skin for detecting the colour variation of the patient's blood stream and thus calculate the pulse rate.During this phase, a phone call would be triggered to the emergency contact if there's an absence of immediate care taker.The designated caretaker or emergency contact can locate the patient's whereabouts by using our IOS-Android-Microsoft mobile app after logging in with their registered email and one time password sent to their phone.As our smart band is always listening hence it would be able to identify any abnormal activity concerning the patient and notify the right team like fire-brigade or police. A mobile sim card slot would also been provided for the use of an active SIM card with internet facilities. This device's battery runs for many hours and charges itself with wireless charging which is supported for 15ft at this moment.In the future, the upgraded smart band will also be charged wireless with the available Wi-Fi signals. Moreover, the default once a week appointment with the doctor and medical facility would take care of the battery and device condition.The smart band application can provide facility to store personal details of patient, emergency contact as well as family members like pictures, name, relation etc. which can help patient to recollect the family.The system with the facility of a VR headset provides patient with the facility to play various games/quiz which can generate intelligence report and determines the progress of the patient.Besides, this Smart band will consist of a 6 digit resetter locker, so that only the person who knows the code can unlock and open the band from patient's wrist.

Our system aims to provide following functionalities:

• VR headset System helps the patient to remember faces/names of family members by displaying them

• Gives reminder to have medicine

• Play mood changing music to relax patient mind.

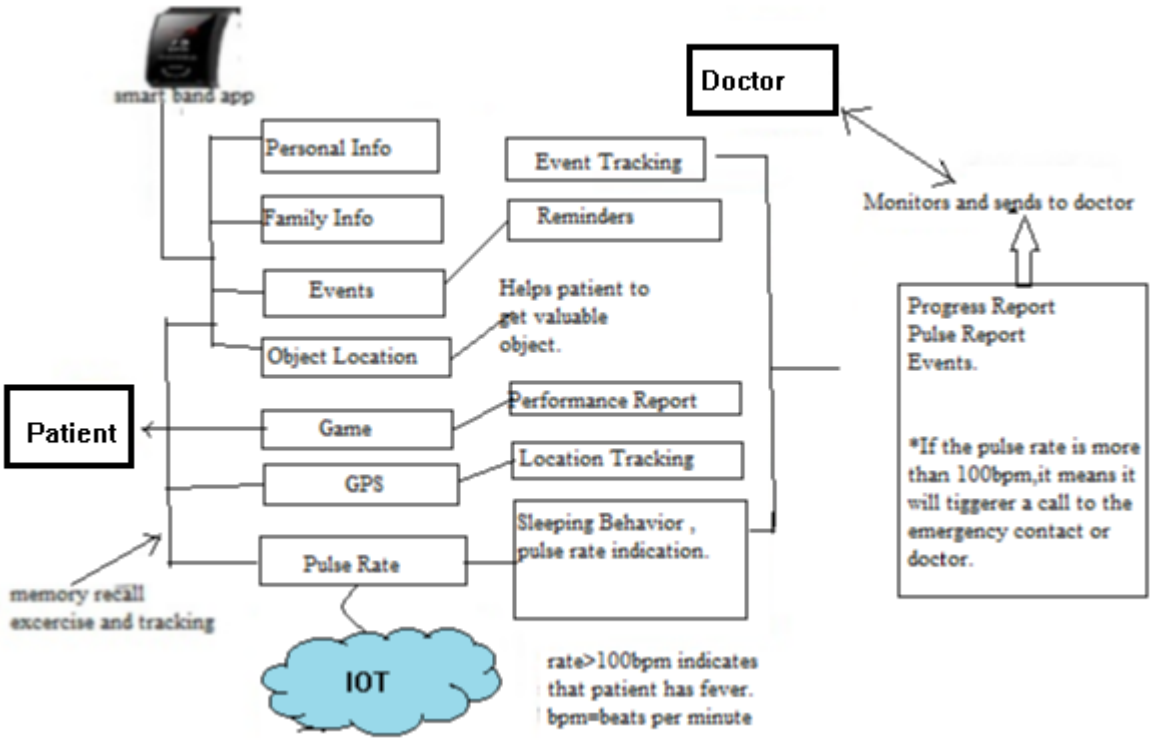
• The application in the smart band tracks location of patient through it's built in GPS sensors and finds the absolute location in the house with the zigbee. Then,sends the information to the cloud all the time. Please note that the smart band works fine, offline with certain limitations.

• It tracks the movement, abnormal sleeping activity and disease of patient.

• It provides schedule as reminder alarm and information on location of patient's objects.

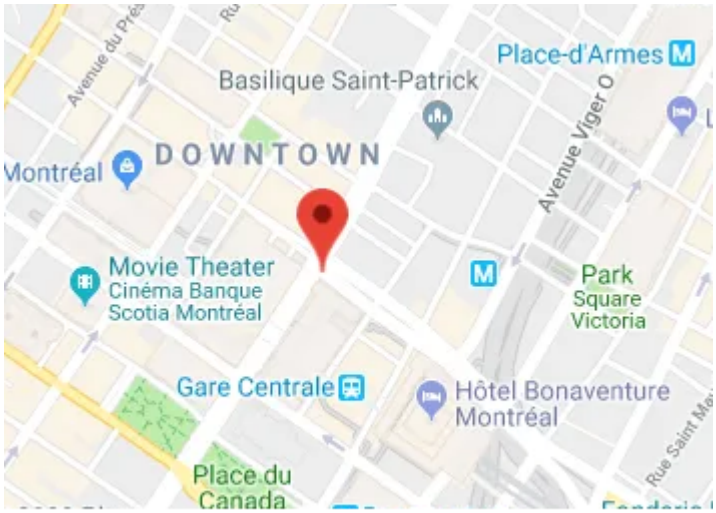
• It also helps the patients to estimate his/ her progress by progress report which will be generated by playing games.

7 Block Diagram:



8 Application User Interface:

9 Current Location:



The Red symbol shows patient current location.

10 CONCLUSION

The smart band Application plays an important role in assisting patient thus enhancing their lifestyle. With a working smart band, the patient would never

get lost. If an event is missed like food intake over a considerable period of time then the effect shows up in the emergency report sent to the designated doctor and also emergency contact, only if they choose to receive such updates. A full-time nurse needs to be appointed by the doctor, henceforth. The smart band can also detect abnormal sleeping activity and include that in the progress report.

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