



Design of Smart Health Monitoring System for Alzheimer's Patients

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Abstract: Alzheimer's disease (AD) is a health disorder that affects brain functionality and slowly destroys memory. These days Medical Treatment turns out to be exorbitant which builds demand for e-medical services (electronic medical care). In this research paper, I propose a Smart Health Monitoring System which helps Alzheimer's patients consistently observing of their health symptoms. The patient's location and movements can be followed and recorded with the assistance of GPS and the Internet. Subsequently, a medical specialist can perform a remote diagnosis of a patient's health condition. The e-medical services system is expected to work with clinical therapies, improve the life quality of patients, and minimize medical services costs.

Keywords: Alzheimer's disease, health care, Remote Health Monitoring, and E-Healthcare.

I. INTRODUCTION

Alzheimer's disease (AD) is yet incurable. The psychological and emotional repercussions are troubling for both patients and their family members. It has been found that the progression of this disease takes twelve years in three phases. The 1st stage, which endures one to three years, begins with indications of atypical biomarkers and repeating mild cognitive issues. In the subsequent stage (three to a decade), the patients experience temporary memory loss, moderate mental impairment, and the presence of pathophysiological biomarkers. At last, the third stage, which is also referred to as dementia, continues for eight to twelve years. Deplorably, AD patients will probably experience obvious memory loss, clear mental deterioration, and successive unforeseen deviant biomarkers. Further research proposes that mental, sensory, and behavioural changes might start to show up before the presence of clinical side effects of Alzheimer's disease quite a long while in advance. Unfortunately, AD's pervasiveness is expected to impact around 74.7 million individuals by 2030.

Therefore, Alzheimer's disease patients' life-support gadgets became popular, and it is a continuous research exploration. Biomedical designing medical care innovations for AD patients are steadily advancing into our regular routines.

The day-to-day routine of patients with Alzheimer's disease (AD) comprises a rapidly extending medical services responsibility. In this research paper, an innovative design of a remote monitoring smart healthcare system is proposed as a solution for Alzheimer's patients health monitoring. This prototype is intended to gather three principal biomedical design advances:

1. Internet-enabled smart device (phone or tablet or laptop/Desktop)
2. Continuous observing of patient's vitals
3. Alerts of fall down conditions
4. Movement tracking using GPS

II. MATERIALS AND METHODS FOR THE PROPOSED SYSTEM

Bluetooth-based home patient observation system, facilitating help to caretakers to screen Alzheimer patients remotely. This e-medical care system comprises two primary parts, in-home patient monitoring, and remote diagnosis. With the support of short-range Bluetooth communication & GPS, patient's vitals and the location can be captured and reported to clinical professionals. The gathered information is then communicated through the internet to an Artificial Intelligence (AI) based smart decision making system. A healthcare expert uses this intelligence decision system and decides if the patient of interest is fostering Alzheimer's disease. This original e-medical care system is expected to work with clinical therapies, lessen generally medical care costs, and conceivably work on the improving quality of a patient's life.

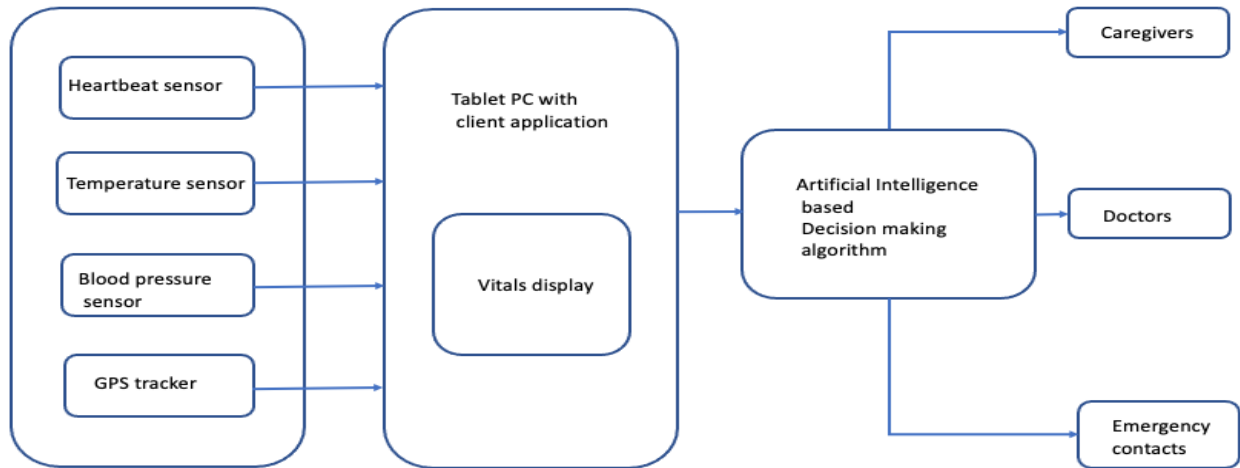


Fig. 1 Block diagram

III. PROPOSED PROTOTYPE

The proposed prototype functions as displayed in fig.1. A Bluetooth-based smart monitoring device is attached to the patient. It assists in tracking the patient's location as well. This device is constantly conveying vital values to the Transceiver (Mobile phone or Tablet or Laptop) which is associated with the server by means of the Internet. The transceiver shows the patient's vital signs like heartbeat rate, blood pressure, body temperature, patient location, etc.

An alarm or buzzer is used for emergencies when the patient is under monitoring in a critical condition it beeps and furthermore alerts surrounding people. An artificial Intelligence-based decision-making algorithm performs vital analysis and alerts medical practitioners and caretakers in case of emergency. This proposed module serves for the early detection of symptoms of Alzheimer's patients.

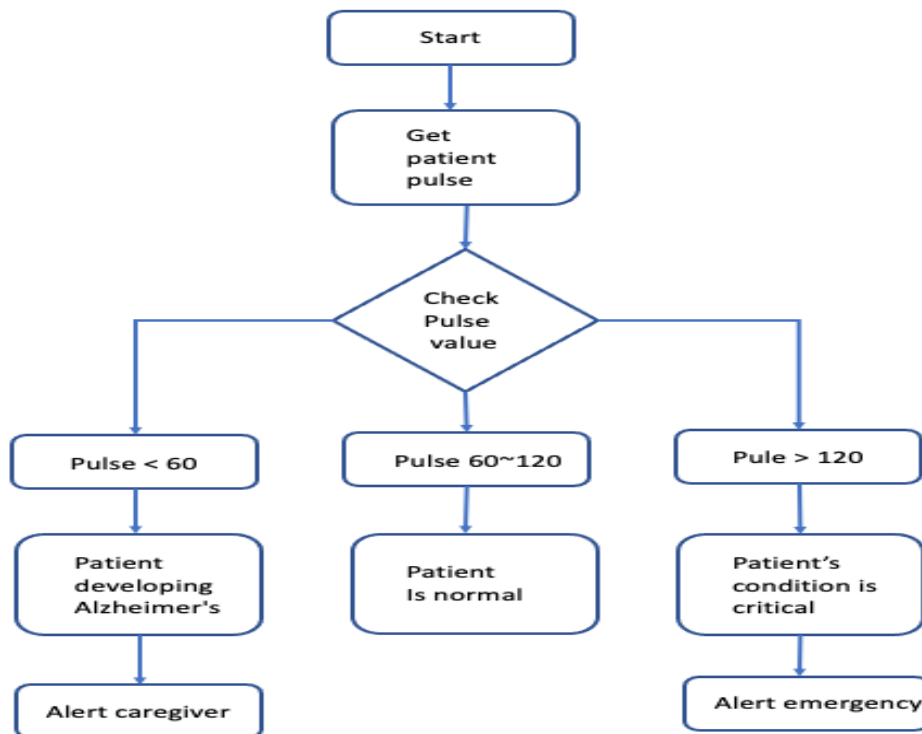


Fig. 2 Decision Making Algorithm



IV. RESULT ANALYSIS

Results of the proposed Alzheimer's patient monitoring system is partitioned into three different conditions i.e. Normal condition, critical condition and developing Alzheimer's disease which are displayed in figure according to condition of patient.

1. Normal Condition:

A normal person or healthy person has a pulse rate of 60 to 100 but here we set it to 60 to 120. Then pulse rate and location are detected and stored in the server. If the detected pulse is in the normal range, then the decision-making algorithm shows as "Patient Normal" to caregivers.

2. Critical condition:

Sometimes patients may suffer from cardiac arrest or heart attack so there is immediate attention is needed so we are adding critical condition as an extra feature. For critical conditions, we set the max pulse rate to 120 as detected goes beyond 120 our algorithm indicates "Patient critical Needs Attention" to caregivers. In critical conditions, the alarm beeps continuously and the system becomes mature until the patient gets attention.

3. Alzheimer's patient:

As per previous research Alzheimer's patient's heartbeat falls below 60, So if the patient heartbeat falls below 60 or decision-making algorithm detects "Patient Developing Alzheimer's Disease" and alerts caregivers and medical practitioners.

V. CONCLUSION

With current technological advances, e-medical care systems are supposed to be prevalent in the coming future. Providing high-quality, affordable, and relevant medical services to everyone. The proposed Bluetooth-based home patient monitoring framework to work with early detection of Alzheimer's Disease. Using the proposed e-medical services system, a specialist can offer better treatment to the patient, subsequently reducing frequent hospital visits.

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