Aide Memoire Device

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Abstract: *A device that serves as a fall detector as well as a reminder for medication intake timings The device is designed using WEMOS D1mini. It can be used by people who are old, pregnant women, people who are suffering from Alzheimer's disease, etc. It can prove to be of great use and comfort for people. The project's goal is to implement an Internet of Things system using WEMOS D1mini and Blynk. The objective is to build an IOT medical aid system. The Blynk app is used to send a notification if any emergency situations, like a fall, occur, as well as to notify a person about his or her medications. The location of a person is traced through a location tracking app by the caretaker or a family member by entering the victim's mobile number in the location tracking app. A person can use the device as a wearable band.*

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I.   Introduction

As the problem of population aging increases, more and more elderly people increase. The response speed, balance of the elderly are relatively poor, they cannot protect themselves well when facing unexpected situations. There are concerns for those who are facing a medical situation or get lost without any assistance near them. Discharged patients from hospitals need more medication order compliance creating the essential conditions for reviewing the patient medication administration orders after discharge decreases the hospitalization and mortality, and increases patient quality of life. The problem that are identified was that a fall can cause serious injuries if no immediate assistance is taken, and the fear of fall limits independent activities and social engagement of the elders also they forget to take medicines on time, which can have several ill effects on health. To solve such problems, this prototype that can be used as a wearable device, or else it can be carried in their pockets and sends alerts to the first responders or caretaker when a fall is detected and even alert the user at the scheduled time about their medicine. There are fall detection devices that are available on the current market, which are expensive and it includes too many unnecessary functionalities. As this project mainly focus on elderly users, it provide an affordable solution that are easily accessible to them. The purpose of this system is to design a wearable device to remind or remind the user to take medicines 1 or 2 or 3 times a day. This project which is cost effective and reliable to detect fall, to remind the medicines intake timings and alert the caretakers for help and support.

II.   Literature Survey

The purpose of this literature survey is to study the Aid Memoire Device and its drawbacks. To know more about the alternative solutions that are implemented instead of our proposed model related literature review and to get the knowledge about the different technologies that are implemented to design a system.

[1]A Fuzzy Model for Human Fall Detection in Infrared Video Marina V. Sokolovaa, Juan Serrano-Cuerdab, Jos Carlos Castillob and Antonio Fern andez - Caballerob, South-West State University, Kursk, Russia Instituto de Investigacion en Informatica de Albacete, Universidad de Castilla-La Mancha, Albacete, Spain, 2018. In this paper, a human detection algorithm is used for detecting fall inactivity monitoring of a person using infrared video and fuzzy based model. Human detection algorithm uses the data to detect whether the true fall has occurred or not. The characteristics such as geometrical blob which corresponds to the victim and also velocity is considered to be the fall indicators. Fuzzy model also enables certain parameters while evaluation of the device. [2]Fall Detection Systems Using Data from Smartphone Sensors: Md. Milon Islam, Nieb Hasan Neom, Md. Samir Imtiaz , Sheikh Nooruddin, Md. Repon, Khulna , October 2019. This paper uses ML or TBA techniques or both of them to detect fall using smartphone. The systems employing threshold based algorithms had a low percentage of accuracy but they require less computational power and produce fast output. Smartphone has to be kept in specific position to get the better results while using machine learning based algorithms. Systems produced better

accuracy both in detecting fall and ADLs but was less reliable for real-time devices. Machine learning based systems also drain the batteries faster. The Combined technology of threshold based and machine learning based systems produced good accuracy but with the cost of high computational power usage. [3]Analyzing and Implementing a Mobile Reminder System for Alzheimer's Patients Shooq Alharbi, Aisha Altamimi, Fadwa Al-Qahtani, Bashair Aljofi, Mutasem K. Alsmadi. Department of Management Information Systems, College of Applied Studies and Community Service, Imam Feb 2019. A smart phone is used to develop the work in this system. The main aim of this system is to help a special category people that is Alzheimer's patients, this proposed system gives them the ability to have small memory can help them to remember all tasks to live and the technology is the best care because it is not susceptible to forget or damage. The system reminds the Alzheimer's patients of their families through memories and family photos and information, and the dates of their medications, the amount of medicine and hospital appointments.

[4]Smart Fall Detection System for Elderly People with IOT and sensor Murugeswari V, Shruti N, Sindhuja G, Department of Electrical Engineering, institute of information technology canal south road, bliaghata, Kolkata. Algorithm uses the fall-feature parameters of the 6-axes acceleration to detect. Some of the possible falls were chosen through the simple threshold values and applied to the MPU to solve some of the problems such as deviation of interpersonal falling behavioral patterns and similar fall actions. The parameters of threshold acceleration and velocity values has been given to get the best fall detection with specificity, sensitivity and accuracy which were over than 95%. These results demonstrate the reduction of the computing effort and resources, compared to those of using all the events applied. The proposed algorithm is very simple because it depends on a simple sensor (measure the angle) and the program that calculates the angular velocity and acceleration. [5]Automatic Fall Detection using Smartphone Acceleration Sensor Tran Tri Dang, Hai Truong, Tran Khanh Dang, International Journal of Advanced Computer Science and Applications Engineering, December 2016. This proposed technique consists of 2 algorithms: long lie detection and fall detection. Occurrence of a fall is checked by the former and if there is a lying down state after that fall is checked by the latter. By combining these 2 algorithms, we can solve the issue by partially between achieving a high true positive rate and keeping a low false positive rate. The phone accelerometer is used to capture the data by this system. But the limitation of this device is that as phone can sense false fall and also patients will not be carrying phone all the time. [6] Patient Medication Reminder Circuit using Microcontroller Ibrahim Adabara, Department of Electrical and Computer Engineering, Kampala International University, Uganda, March 2018. Many of the patients who are suffering from memory loss requires a special hardware device to remind the patients about the medicine in-take timings. To purchase a new hardware device becomes costly and time consuming. So in the given work, an attempt has been made to implement a system which will be economical, easily accessible and improves medication adherence. The patients will get the message of intake timing of a medicines will be scheduled with the medicine description, start date of the medicine and also end date of medicine will be displayed, alarm system is installed so that when notification occurs through liquid crystal display(OLED) an alarm starts to ring. At the scheduled time, the correct medicine name will be displayed so that it would be easy for the patients to keep track of the medicines.

III. Summary of the Literature survey

The outcome for the literature survey are as follows:

1.   Understand the various methods that are implemented for medicationremainder and fall detection system.

2.   Some of the surveys have dealt with an machine learning systems which gives thebest accuracy but drains a battery faster.

3.   Some methods are based on sensors which are present in the smartphone which is notmore accurate.

4.   A few literature surveys that included on wearable sensor-based methods likeraspberry pi which is costlier than Arduino.
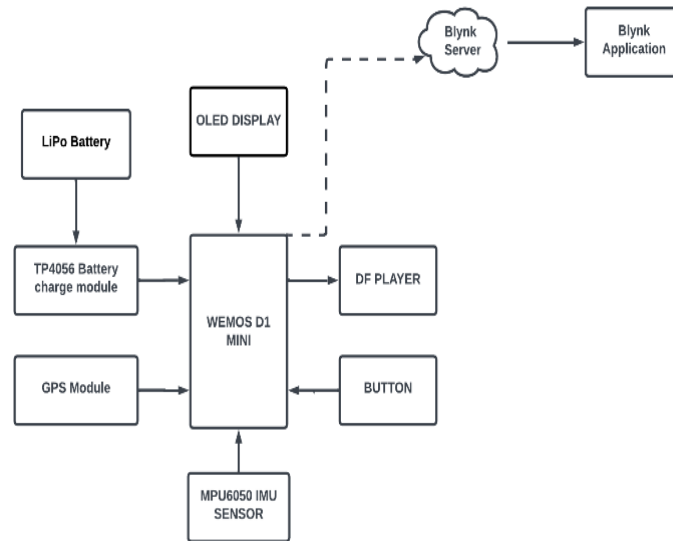
IV. Methodology

Fig 1. Block diagram of "Aide Memoire"

The block diagram of "Aide Memoire device". The power from the Lipo battery is given to the TP4056 battery charge module which then powers the WEMOS D1mini which controls the functioning of the device in order to operate it automatically. The device uses MPU 6050 sensor, which detects the fall when there is a sudden change in the body movement. when fall is detected, it will send a signal to the WEMOS D1mini. WEMOS D1mini will send a message to the caretaker using a blynk application.

It will also send a message which is programmed to be displayed on the OLED. In case if there is any emergency to the patient who is wearing the device, if he/she presses the push button emergency alert message is sent to the caretaker and also displayed on the OLED. The device will alert the patient about their tablet to be taken at a scheduled time by displaying in the OLED and giving voice assistance using DF player. The Location of the patient can be tracked using the GPS module.

When detected the fall when there is a sudden change in the body movement. when fall is detected, it will send a signal to the WEMOS D1mini. WEMOS D1mini will send a message to the caretaker who is using a blynk application.

Methodology for the works as follows:
1. It monitors the fall of a person if he/she is away from the home or caretakers
2. If there is any fall, The integrated system with blynk app for sending SMS alert to the caretaker and to track location of the patient.
3. It also reminds to take medicine in stipulated time by giving voice assistence

V. Results and Discussions

In this project is used as the heart of the embedded system which is then connected to sensor like MPU6050. In case if there is any emergency to the patient who is wearing the device, if he/she presses the push button emergency alert message is sent to the caretaker and also displayed on the OLED. The device will alert the patient about their tablet to be taken at a scheduled time by displaying in the OLED. The Location of the patient can be tracked using the location tracking app.The MPU6050 send a signal to the WEMOS D1mini when fall is detected and send the alert to the caretaker system.This project also gives the alert to take medicine in time to the caretaker as well as to the patient and its also displayed on the OLED.

Fig 2. Proposed Model of "Aide Memoire Device"

Result Analysis

Result Table				
Feature	**Total Trials**	**Success Rate**	**Failure Rate**	**Result**
Fall Detection	50	48	2	96%
Medication Reminders	50	49	1	98%

VI. Conclusion

When the caregiver is away from the patient or victim, the patient or victim feels insecure; our model sends an alert message to the caregiver when the victim is away from the caregiver.Many studies are made to detect falls. Our system, which works based on the IOT, provides the alert message and also provides a special feature of a panic button that is used in emergency situations when the victim feels uncomfortable.

In this work, a smart device with an Android system was developed. The proposed smart device's main goal is to assist an important category of society, which is the patients in need, by providing them with the ability to have a small memory, which can help them remember all tasks to live, which may contribute to lowering the cost of medical help.

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