Smart Capsule Dispenser With Vigor Surveillance

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Abstract- *Taking medication on time and monitoring one's health status is crucial for patients with chronic illnesses or elderly people.The conventional system uses a manual reminder system, where the caregiver reminds the patient about their medication schedule and monitors their health status. However, this system is prone to human error, and it may not be possible to monitor the patient's health status around the clock. The capsule reminder system reminds the user of their medication schedule and records their heart rate, temperature, and physical activity level to detect any abnormal changes. The GPS-GSM module is used for fall detection alert and to send the user's location to their emergency contacts. The RTC module is used to set the medication schedule, and the display unit reminds the user of their medication schedule. The heart beat sensor, temperature sensor, and accelerometer are used to record the user's health status. The GPS-GSM module is used for fall detection alert and to send the user's location to their emergency contacts. The heart beat sensor is used to measure the user's heart rate, and any abnormal changes in heart rate are recorded. The temperature sensor is used to measure the user's body temperature, and any abnormal changes are recorded.*

Keywords- GPS,GSM,Temperature Sensor, Heart Beat sensors, Mems Sensor.

I. INTRODUCTION

In modern society, most of the time people remain busy in their daily life schedule.It is true that they give more preference to their work than taking care of their health. Several diseases like diabetes, blood pressure is nowadays very common. Maintaining daily medication become very difficult for old people. Sometimes younger is faced with the same problem.There are many people in our family who need constant help may it be our elderly people, younger or others. But it is not always possible for us to remind them of their medicine’s dosages every time.For this purpose, there needs to be some facility for us which monitoring patient and take care. Nowadays we are all used to living technology based life. We can use this technology in a way that will be beneficial for us.We propose an RTC based capsule reminder system with a heartbeat sensor, temperature sensor, accelerometer, and GPS-GSM module for fall detection alert. The system provides timely reminders, records the user's health status, and alerts emergency contacts in case of a fall.

II. LITERATURE SURVEY

[1] The main working principle of this box is remainder to consume capsule at right time and also give remainder if the capsule are going to finish.This setup to identify the room temperature and humidity.

[2]A communication system, patients and service providers communicate with each other via an open internet channel. In this paper, we introduce a 6G-aided intelligent healthcare environment. Our work also proposes a solution called Centreless User-Controlled Single SignOn (CL-UCSSO) for achieving a convenient and cost-saving communication in a multi-server system constructed.

[3] It further reduces unnecessary hospital visits and the burden on healthcare systems by connecting the patients to their healthcare experts (i.e., doctors). Since Artificial Intelligence has a great impact on the performance and usability of an information system, it is important to include its modules in a healthcare information system, which will be very helpful for the prediction of some phenomena, such as chances of getting a heart attack and from the collected healthcare data.

[4] Using Health care, machine learning, precision medicine, statistical modelling monitoring the people.This can be used to create more cost-effective systems of healthcare.

[5]The sensors used will continuously monitor the patient's health. If there is any variation then the doctor varies the number of capsule to be taken. The doctor can remotely update the medication details in the IOT server and timely updates about medicines are available to patients.

[6] The Image Processing principal including the Grayscale Method, Threshold Method, OTSU Method, Bounding Box Method and Geometric Algorithm was adopted to process images from normal webcam camera. In addition, the

Microsoft was used for processing the signals byanalyzing the output signals of webcam camera.

[7]This system can also be monitored by the patient parents as it will be linked to a phone application. This application will be used to configure the medical box.

III. EXISTING METHOD

The Smart pillbox System need more attention from the family side to take care of them.So for this issue a well-equipped automatic reminder to consume capsule at right time, for this introduced smart pillbox which considerably reduce family responsibilities. Over on this peak of technology, this smart capsule is prepared by using GSM interfaces with Arduino and also implemented IOT through Blynk app receive notifications. The major responsibility of making people to consuming capsule is resolved by using this smart capsule setup. The main working principle of this box is remainder to consume capsule at right time and also give remainder if the capsule are going to finish. Sensors are arranged in the setup to identify the room temperature and humidity and all the information is can view through the Blynk app from anywhere.

DRAWBACKS

- Low accuracy
- Unwanted materials detected
- High weight and high size
- Sometime sensors aredid not detect environmental situations.

PROPOSED METHOD

The proposed system is an RTC (Real-Time Clock) based capsule reminder system with additional features such as

- Capsule Dispenser
- Pulse sensor
- Temperature sensor
- Heart Beat sensor
- Accelerometer-based fall detection
- GPS & GSM

The system is designed to help patients with chronic conditions or those who require medication on a regular basis to remember to take their capsule at the right time, monitor their health status, and alert their caregivers in case of emergencies.

The proposed system is an RTC (Real-Time Clock) based capsule reminder system with additional features such as a heart beat sensor, temperature sensor, accelerometer-based fall detection, GPS, and GSM. The system is designed to help patients with chronic conditions or those who require medication on a regular basis to remember to take their capsule at the right time, monitor their health status, and alert their caregivers in case of emergencies.

RTC-based capsule reminder: The system will have a real-time clock that will trigger an alarm at the set time to remind the patient to take their medication.

Heartbeat sensor: The system will also include a heartbeat sensor that will monitor the patient's heart rate and alert the caregiver in case of abnormalities.

Temperature sensor: The temperature sensor will monitor the patient's body temperature and alert the caregiver in case of any abnormal readings.

Accelerometer-based fall detection: The system will also include an accelerometer that will detect falls and alert the caregiver in case of emergencies.

GPS and GSM: The system will use GPS and GSM to provide the location of the patient in case of emergencies.

This proposed system is a comprehensive solution that combines a capsule reminder system with health monitoring features and emergency alert capabilities. The system is designed to improve patient compliance with medication and improve their overall health outcomes while providing peace of mind to their caregivers.

ADVANTAGES

- Needs no prior technical knowledge.
- Sound reminder enables user to take medicines in regular times.
- Provides more medical assistance.

V. METHODOLOGY

The patient will wear the device that includes the sensors and the RTC. The patient will set the reminder for the medication, and the RTC will trigger an alarm at the set time. The heartbeat sensor and temperature sensor will monitor the patient's heart rate and temperature, respectively. If any abnormalities are detected in the heart rate or temperature, the caregiver will be alerted through the GSM module. If a fall is detected, the accelerometer will trigger an alert, and the

caregiver will be notified through the GSM module. In case of an emergency, the GPS module will provide the patient's location to the caregiver through the GSM module.

BLOCK DIAGRAM

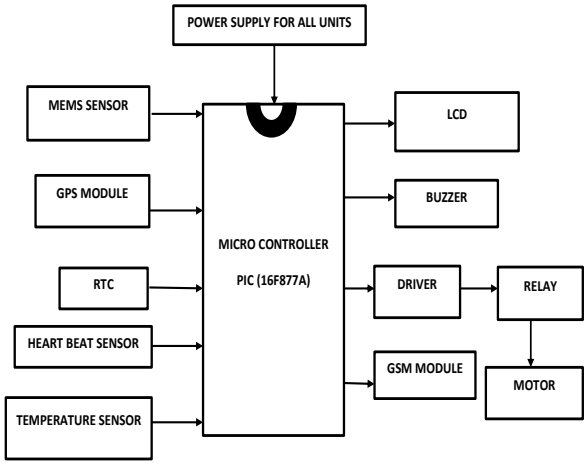

Fig 1.Smart Capsule Block Diagram

HARDWARE DESCRIPTION

A. PIC(16F877A)MICROCONTROLLER

The PIC microcontrollers are meant to enable simple programming and interfacing in embedded system design. The PIC controller compared to other controllers is with low cost. The clock speed of the controllers is high with the rate of 20MHz.Power on reset and brown out protection ensure that the chip operates only when the supply voltage is within sections. The PICIC(Integrated Chip) is having wide operating voltage range from 2.5 to 6V, using power saving devices with a less power loss.

Fig 2.PIC Microcontroller

B. TEMPERATURE SENSOR

The LM35 is an integrated circuit sensor that can be used to measure the temperature level. Temperature sensor is used to detect the patient body temperature level of the surface area.It is controlled by PIC microcontroller and the information are sent through GSM module to the caregiver. Temperature sensor is connected to the microcontroller . This sensor is raise above 99 degree fahrenheit to produce alarm sound from the buzzer.

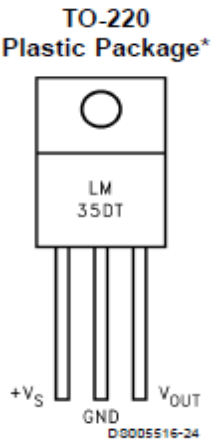

Fig 3. Pin diagram of LM35

C. HEART BEAT SENSOR

A person's heartbeat is the sound of the valves in his/her heart contracting or expanding as they force blood from one region to another. The number of times the heart beats per minute (BPM), is the heartbeat rate and the beat of the heart that can be felt in any artery that lies close to the skin is the pulse. Heart Beat can be measured based on optical power variation as light is scattered or absorbed during its path through the blood as the heartbeat changes.

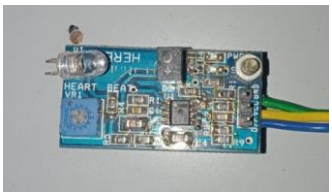

Fig 4. Heart Beat Sensor

D. GSM MODULE

Global System for Mobile Communication (GSM) is a standard developed by the European Telecommunications Standards Institute (ETS). These modules often used for interfacing with PIC microcontroller.GSM module is a device that uses GSM mobile telephone technology to provide a wireless data link to a network. GSM module are used to send notification for caregiver mobile telephone network. They use SIMs to identify their device to the network.

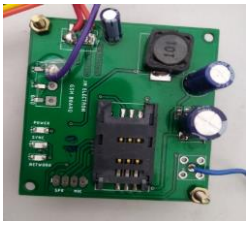

Fig.5GSM module

E. BUZZER

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. It indicates the patient when time is over to take medicine.

Fig 6. Buzzer

F. POWER SUPPLY

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. 12v battery is fixed to supply the motor for PIC microcontroller.

G. LCD DISPLAY

A Liquid Crystal Display commonly abbreviated as LCD is basically a display unit built using Liquid Crystal technology. The most basic form of electronic display available is 7 Segment display – which has its own limitations. The most commonly used one is 16×2 LCD Module which can display 32 ASCII characters in 2 lines (16 characters in 1 line). It is used to display the time, date, tablet count, body temperature, heart beat rate and tablet name.

Fig 7. LCD diplay

H. RTC (REAL TIME CONTROL)

Real Time Clock or RTC is a system that keeps track of the current time and can be used in any device which needs to keep accurate time. It also keep tracking the exact time without using RTC systems.

Fig 8.RTC module

I. GPS MODULE

GPS is a system of 30+ navigation satellites circling Earth. We know where they are because they constantly send out signals. A GPS receiver in your phone listens for these signals. Once the receiver calculates its distance from four or more GPS satellites, it can figure out where you are.

Fig 9. GPS module

VI. SOFTWARE DESCRIPTION

MPLAB IDE SOFTWARE MPLAB is a proprietary freeware integrated development environment for the development of embedded applications on PIC and PIC microcontrollers, and is developed by Microchip Technology. MPLAB X is the latest edition of MPLAB, and is developed on the Net Beans platform. MPLAB and MPLAB Xsuppo

MPLAB is designed to work with MPLAB-certified devices such as the MPLAB ICD 3 and MPLAB REAL ICE, for programming and debugging PIC microcontrollers using a personal computer. PIC Kit programmers are also supported by MPLAB.MPLAB 8.X is the last version of the legacy MPLAB IDE technology, custom built by Microchip Technology in Microsoft Visual C++. MPLAB supports project management, editing, debugging and programming of

Microchip 8-bit, 16-bit and 32-bit PIC microcontrollers. MPLAB only works on Microsoft Windows. MPLAB is still available from Microchip's archives, but is not recommended for new projects.

VII. OUTCOME OF PROJECT

The model proposed through the medium of this paper, indeed facilitates the patients in reminding them off taking the medicines on time. It's easy circuitry allows an individual to use it without any hindrance. When the internal timer of GSM is reached to the scheduled time a continuous beep of buzzer gets enabled and the light of that compartment from which the medicine has to be taken gets enabled .This allows the patient to take medicines from the dispenser , his movements disrupt the Infrared signal which eventually results in sending a notification onto the mobile phone of caretaker or patient as shown in Fig.4, this actually ensures that medicine has been taken out of the dispenser .Such technology is not seen in the dispensers available at high cost , secondly the notification of changing the place of the box is also being appended for ensuring no change in the potency of the medicine as minor alterations in the temperature and humidity often leads to change in the potency which has its own adverse effects on human body .The notification for change of place presented in Fig.5. The circuitry attached with the dispenser as shown in Fig.6 imparts straightforward connections and the chances of connection debacle are rare. The compartment identification can be easily differentiated with the help of the light emitting diodes attached to the dispenser which is shown in Fig.6 and Fig.7, these are the two different compartments having dissimilar color of diodes for proper identification. The Liquid Screen Display is used to impart the information of the compartment to be opened once signaled from the processor.

If the signaled compartment is first the LCD will display "COMPARTMENT FIRST" as a notification to the patient or to the person who is taking care of that patient see Fig .8 which illustrates how the display will showcase the name of that specific compartment. The DHT11 is just to ensure the temperature and humidity of the surrounding of the dispenser minor changes if neglected will surely give rise to major complication. The proposed model helps in assisting an individual who keeps forgetting to take his medicines, along with that a notification of changing the place of dispenser on hike in humidity values make it dissimilar from the ones presently available in market.

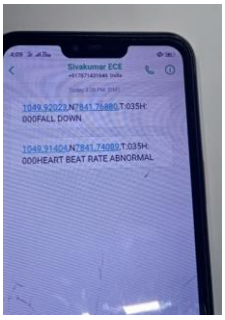

Fig.10 Emergency Alert Message

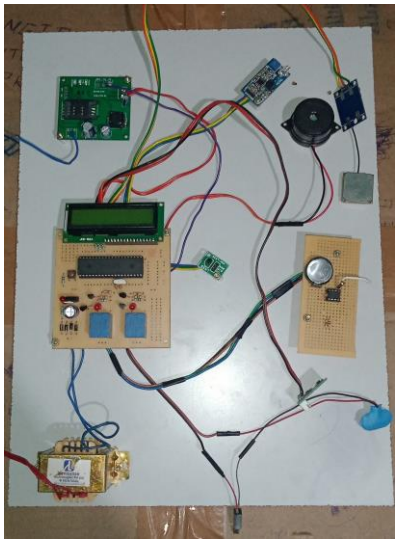

Fig.11 Top View of Kit

VIII. CONCLUSION

GPS technology enables the capsule box to track the patient's location and ensure that they are taking their medication at the right time and in the right location. The GPS can also be used to alert caregivers if the patient is not taking their medication as scheduled. The GSM technology allows the capsule box to communicate with the caregiver or medical professional if the patient misses a dose or if there is a problem with the medication.

Heart rate monitoring and temperature sensing can provide information about the patient's health status and alert the caregiver if there are any concerns. The accelerometer technology can detect when the capsule box is opened and closed, allowing the system to track medication usage and ensure that the patient is taking their medication as prescribed.PIC technology is used to control the various sensors and components of the smart capsule dispensing system. RTC technology ensures that the system maintains accurate time and date information. In conclusion, a smart capsule dispensing system that utilizes GPS, GSM, heart rate monitoring, temperature sensing, accelerometer, PIC, and RTC technologies can provide an effective solution for

patients who require medication management. This system can help ensure that patients take their medication as prescribed and provide peace of mind for caregivers and medical professionals.

IX. FUTURE SCOPE

Wearable devices such as smart watches can be integrated with the smart capsule dispensing system to provide additional health data, such as sleep patterns and exercise levels. This can help healthcare providers to get a more comprehensive picture of the patient's health. Machine learning algorithms can be used to analyze the data collected by the smart capsule dispensing system. This can help to identify patterns and predict when a patient may be at risk of missing a medication dose or experiencing a medical emergency. The smart capsule dispensing system can be connected to a remote monitoring system, allowing healthcare providers to monitor the patient's health status and medication adherence from a distance. This can be particularly useful for patients who live in rural or remote areas. The system can be further customized to provide personalized medication management for each individual patient. This can include customized dosage schedules, medication reminders, and alerts for potential drug interactions or side effects. The smart capsule dispensing system can be enhanced to improve communication between the patient, healthcare providers, and caregivers. This can include features such as video conferencing, secure messaging, and shared access to health data.

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