SMART MEDICINE REMINDER AND HEALTH MONITORING SYSTEM

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ABSTRACT: In recent years, the growing need for healthcare assistance, particularly for elderly and chronically ill patients, has driven the development of smart healthcare solutions. This project presents a Smart Medicine Reminder and Health Monitoring System that integrates Internet of Things (IoT) technology, real-time health tracking, and automated medication alerts to ensure timely medical care. The project presents a Smart Medicine Reminder using an ESP32 controller designed to ensure timely medication intake while continuously monitoring patient health parameters. Additionally, the system automatically activates the voice alert if an abnormal heart rate is detected, enabling rapid response to potential health risks. A dedicated web page allows set medicine schedules, receive timely voice-based reminders, and remotely monitor the heart rate data. This method is useful for elderly care, chronic illness management, post-surgery recovery, and remote patient health monitoring with timely medicine reminders and emergency alerts. Overall, the project offers a simple, smart and modern way to share important information quickly and efficiently.

KEYWORDS: IOT, MEDICINE, HEALTH, ESP32, HEART RATE.

I.INTRODUCTION: The modern healthcare environment, continuous health monitoring plays a vital role in early detection of diseases and improving patient care. With the increasing need for automation in healthcare, smart devices have become essential to automatically record health parameters and alert users about their medical conditions. Smart Medicine Reminder and Health Monitoring System is designed to address this requirement by integrating health tracking and medicine reminder features in one compact unit.

This system is based on a microcontroller such as Arduino, which controls various sensors and modules to monitor vital signs like body temperature and pulse rate. These sensors are part of an embedded system that continuously gathers physiological data and sends it through wireless communication

modules such as GSM, Bluetooth, or Zigbee. The GSM module enables remote alerts and notifications, ensuring that patients or caretakers are promptly informed about medicine schedules or abnormal health readings. The system finds extensive application in medical fields such as elderly care, chronic patient monitoring, and home-based health supervision. A review of existing systems shows that many previous models were limited to either health monitoring or medicine reminders alone, lacking integration between both. This project overcomes such limitations by combining both functions into one system. In today's busy lifestyle, people often forget to take their medicines on time, especially elderly individuals and patients with chronic diseases who require regular medication. Missing doses or taking incorrect medicines can lead to serious health complications. At the same time, continuous monitoring of vital health parameters such as body temperature and pulse rate is essential to assess a person's health condition and detect early signs of illness. To address these issues, the Smart Medicine Reminder and Health Monitoring System has been developed as an intelligent and reliable solution. This system combines two important healthcare functions as a medicine reminder and a health monitoring unit into one compact device.

II.LITARATURE SURVEY: Savithaa.N et al (2021) had designed a smart medicine box which had an android application which is installed on the patient's smart phone. Through this application patients could view their prescriptions and get notifications regarding medicine intake. Medicine box is provided with different compartments. An LED on top of each section signify the right box. At any moment patient opens a mistaken section, a warning will occur with the help of Arduino. A WI-FI shield is attached to the Arduino board and this microcontroller picks up the data and sends it through WIFI module.[1].

Divya Sai. K et al(2021) had designed a medicine box where the schedule data/configuration data is sent to the pill box through IoT. The smart pill box contains Arduino MCU, LED display, LEDs, buzzer, buttons, Pulse Sensor and Temperature Sensor. The LED are used to display the commands in pill box by MCU. The Wi-Fi module is configured with IoT. The configuration data is send to the smart pillbox when the configuration is in ON mode. The concerned LED glow with buzzer at schedule time. It is cost efficient and user friendly as user can set time table

of medicine by himself. Highly reliable and the product can be used for long time. It is easy to use and manufacture It also provides accurate result power generation and distribution networks. [2].

Anandhapadmanaban.S et al(2020) used Peltier module which is imported into one of the compartments made for cold storage and other compartments left without Peltier for room temperature storage. According to medical adherence, box is splitted to store drugs to be taken thrice times in a day. The patient's vital signs namely body temperature and heart beat rate are sensed and sent via sensor probe. An additional switch is built to alert the preset guardian through GSM module when it is triggered by strangers or guardians at emergency situation.[3].

Viral Doshi et al(2019)made a device which consisted of a small box divided into 21 sections for storing pills for a week of up to 3 patients. The box was connected to an RTC module, an Arduino AT mega 2560. The RFID tag will be given to each patient. When it is brought close to the reader, the medication will be dispensed. RTC is used to compare the time the dosage is to be given with the current time. It will check whether the RFID tag is read by RFID reader.

III.PROPOSED SYSTEM: The main objective of this project is to design and develop an intelligent, microcontroller-based device that assists patients in maintaining their medication schedule while simultaneously monitoring their vital health parameters. The system aims to provide timely alerts for medicine intake, continuously record health data such as pulse rate and body temperature, and transmit this information through wireless communication for remote monitoring. It helps elderly and chronically ill patients to follow their prescriptions accurately and enables caretakers or doctors to receive real-time health updates.

The transmitter section represents the wearable unit responsible for monitoring the user's health condition and generating medicine reminders. It collects real-time inputs such as pulse rate, time, and emergency triggers, processes the data using a microcontroller, and transmits alerts and notifications wirelessly to the receiver section. This unit mainly focuses on sensing, alert generation, and communication.

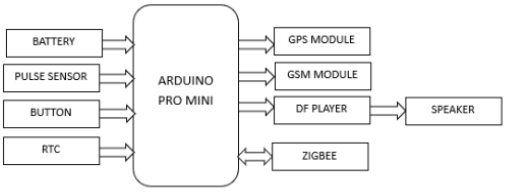

Fig 1 Block diagram of Smart Medicine Reminder and Health Monitoring System (Transmitter side)

The receiver section represents the medicine dispensing unit placed near the medicine box. It receives wireless signals from the transmitter and performs the required action automatically. Based on the received reminder signal, it controls the servo motor to open or close the medicine box, ensuring that the user takes medicines at the correct time.

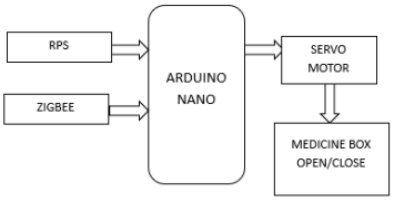

Fig 2 Block diagram of Smart Medicine Reminder and Health Monitoring System (Receiver Side)

The proposed Smart Medicine Reminder and Health Monitoring System is divided into two main sections: the transmitter (patient unit) and the receiver (medicine dispensing unit), which communicate wirelessly using ZigBee modules. The transmitter section is built around the Arduino Pro Mini, which acts as the central controller and manages all sensing, timing, and communication tasks. A Li-ion battery provides portable power to the unit. The pulse sensor continuously measures the patient's heart rate and sends analog signals to the controller for monitoring, while a push button acts as an emergency switch that the patient can press to request immediate help. A Real Time Clock (RTC) module maintains accurate time and supplies the preset medicine schedule. Based on this timing, the controller generates reminders and activates the DF Player Mini with a speaker to play a voice alert prompting the patient to take medicine. During emergencies, the GPS module obtains real-time location coordinates and the GSM module sends an SMS containing the patient's health status and location to the caretaker. At the same time, reminder signals are transmitted wirelessly through the ZigBee transmitter to the receiver unit.

The receiver section is centered on the Arduino Nano, which continuously waits for signals from the ZigBee receiver. This unit is powered by a regulated power supply to ensure stable voltage for reliable operation. When a reminder signal is received, the Arduino Nano processes the data and generates a PWM control signal for the servo motor. The servo motor rotates to open the medicine box, allowing the patient to access the required medicine, and then closes it automatically after a fixed delay. Through this coordinated operation, the

transmitter monitors health and sends reminders while the receiver performs automatic medicine dispensing, forming a complete automated healthcare assistance system.

IV.HARDWARE RESULTS: The figure below shows the hardware module of the project. It consists of DF player mini, RTC module, Arduino Promini, Arduino Nano, Lithium-ion Battery, Pulse Sensor, GSM module, ZIGBEE module, Speaker and Servo motor.

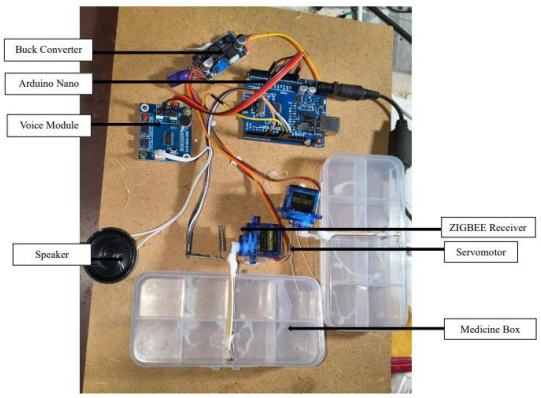

Fig 3 Hardware module (Receiver Side)

The receiver unit performs the final action of dispensing medicine after receiving the wireless reminder signal. The Arduino Nano serves as the control unit, powered through a buck converter that provides a stable 5V supply for reliable operation. The ZigBee receiver captures the transmitted alert and sends it to the Arduino Nano, which then activates the servo motor. The servo motor is mechanically attached to the medicine box lid and rotates to open the required compartment at the scheduled time before returning to its original position. A voice module and speaker are also integrated to generate an audible alert ensuring the patient is notified when the medicine box opens. This module completes the system by converting wireless reminders into physical and audible actions.

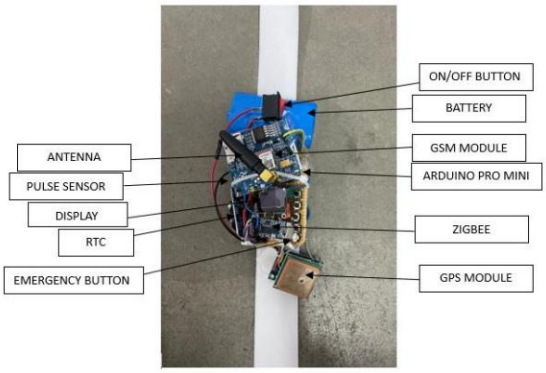

Fig 4 Hardware Module (Transmitter Side)

The transmitter unit acts as the wearable monitoring and alert generation module of the system. It is built around the Arduino Pro Mini, which coordinates sensing, communication, and emergency functions. A rechargeable Li-ion battery powers the device, while the battery charging circuit and boost converter ensure a stable and portable power supply. The GPS module along with its antenna continuously acquires location data, enabling real-time tracking when required. A ZigBee transmitter is used to wirelessly send reminder and emergency

signals to the receiver unit. The emergency switch allows the user to manually trigger an alert, and the ON/OFF switch helps in power management during operation. This module therefore gathers essential data, enables mobility, and transmits signals to initiate the medicine dispensing process remotely.

CASE-I: Automatic Medicine Dispensing at Scheduled Time This test case demonstrates the successful working of the automatic medicine reminder and dispensing mechanism. The system was powered ON and the reminder time was preprogrammed using the RTC module. When the set time was reached, the transmitter unit generated a reminder signal and sent it wirelessly to the receiver unit through ZigBee communication. Upon receiving the signal, the Arduino Nano activated the servo motor, which rotated to open the corresponding compartment of the medicine box. At the same time, the voice module played an audio reminder through the speaker, alerting the user to take the medicine. After a predefined delay, the servo motor returned to its initial position, closing the medicine box automatically. The successful execution of this test confirms that the system can accurately trigger reminders and perform automatic medicine dispensing at the scheduled time without manual intervention.

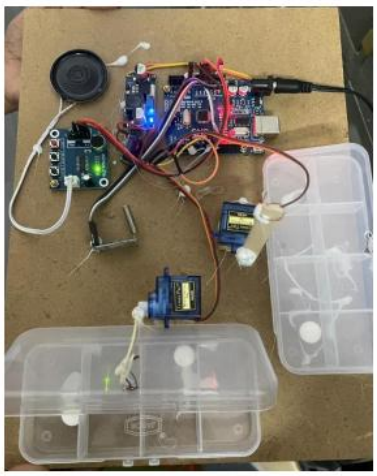

Fig 5 Medicine box opens when its time to take the medicine

CASE-II: Wearable Health Monitoring and Reminder Unit This test case demonstrates the functioning of the wearable transmitter unit designed in the form of a smart watch. The device was powered ON and worn on the wrist to monitor the user's pulse rate and time using the pulse sensor and RTC module. The system successfully tracked the preset medicine schedule while operating in real-time conditions. When the scheduled time approached, the device generated an alert and transmitted the reminder signal wirelessly to the receiver unit through ZigBee communication. This test confirms that the wearable module operates reliably as a portable health monitoring and reminder device, ensuring continuous monitoring and timely communication with the medicine dispensing unit.

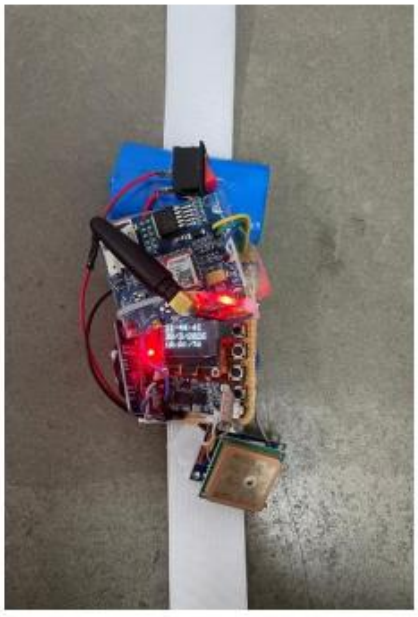

Fig 6 Smart watch showing the time, pulse rate, and the set time to take the medicine

V.CONCLUSION: The Smart Medicine Reminder and Health Monitoring System successfully integrates two critical aspects of patient care—medication adherence and continuous health surveillance—into a single, cohesive, and functional prototype. By combining the fixed Medicine Box Unit (managing schedules via RTC and dispensing via Servo/DF Player) with the mobile Smart Watch Unit (monitoring pulse and ensuring emergency response via GPS/GSM), the project fulfills its primary goal of enhancing patient safety and increasing independence. The use of Zigbee for low-power, short-range communication between the two units proves effective for indoor operation, while the GSM module provides essential, long-distance alerting capability to caregivers. This system stands as a robust foundation for automated personal healthcare management, effectively addressing the widespread issue of medication non-adherence among the elderly and chronically ill. The results confirm the viability of using low-cost microcontroller technology (Arduino Nano/Pro Mini) to create high-impact healthcare solutions.

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