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Automatic Medicine Dispatcher Using Tele-Monitoring System

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***Abstract*— An automatic medicine dispenser with a dynamic remote monitoring system has been developed using IOT. This is to help people in rural areas who cannot find a good/best doctor and do not have 24/7 hospital services. During night emergencies, poor people cannot travel a long distance for simple health problems such as high fever, cold, nausea, and other acute illnesses. The automatic medicine dispenser ATM is a good example of a computerized process. This project provides a solution technique to save time and avoid inconvenience, reduce the workload of most pharmacists, and provide customers with the medications they need. The device consists of a heartbeat, weight, ultrasonic, and temperature sensors to instantly measure the patient's health status and send it to the doctor. The connection to the doctors is established via GSM technology. The patient can talk to the doctors and tell them about his problems. A webcam is installed to have conversations in real-time. The main advantage of this device is that the medicines prescribed by the doctor can be received instantly from the same device with the help of a single relay and a motor. The patient can send a request to the server to know the times to take the pills.**

I. Introduction

An IOT module is used in this project to build a wireless healthcare monitoring system. The continuous and immediate transmission of patient data to the physician or medical staff via remote monitoring is regarded as an efficient method of immediate care. Distant patient observing will rethink medical clinic care, work, home, and amusement. These new innovations will permit us to screen patients routinely, dispensing with the requirement for continuous visits to the nearby doctor for common sicknesses. India's leading cause of death is chronic disease, according to a recent report. Important bodily functions are ceaselessly checked in patients experiencing constant illnesses. Temperature, pulse rate, blood pressure, and blood oxygen saturation are all vital signs. They give the patient information about their health. They can distinguish clinical issues, sicknesses, and physiological anxieties in the body. In hospitals, nurses take care of chronically ill patients in both intensive care units and general wards.

By monitoring a patient's vital signs at home, nurses can help improve their health and reduce costs. This is the normal way to care for elderly people who have chronic diseases, and it's easier for them to avoid hospitalization. When compared to the number of nurses working in a hospital, there are usually fewer patients in a home health setting. Care may be less efficient when relying on sensors and technology alone, so having the advice of a nurse or doctor often leads to better outcomes for the patient. With advances in sensor technology and connectivity, devices can collect data over long periods that can be analyzed to help diagnose diseases as early as possible. Healthcare systems that use IoT systems can monitor patients remotely and store the data so that it can be accessed at any time through a cell phone. These e-health systems help doctors save money while providing better care for their patients.

There is a lot of interest in wearables these days, with many personal health care, fitness, and activity monitoring devices commercially available. Healthcare based on the IoT- a network of devices that are directly connected to collect and share vital data- is growing rapidly, and many data mining techniques are used to identify healthy and unhealthy vital signs without the help of nurses. The patient's vital data from the sensors is analyzed using data mining techniques and this information is then used to wirelessly advise the patient whether their vital signs are healthy or unhealthy.

1.1 Healthcare Management

Sedentary lifestyles today expose people to a wide range of health issues. Due to the rapid expansion of diseases and the emergence of new symptoms for existing diseases, healthcare management is an essential function in today's world. Due to inefficient medical facilities, patients are not receiving timely medical care, and the majority of healthcare organizations are unable to meet the public's medical needs. Due to the development of unusual symptoms related to various diseases, prediction of disease is also an important aspect of healthcare management. A powerful medical services framework is expected to furnish better sickness expectations and therapy with limited costs. Predicting how much of an impact a disease will have on a patient's body is now considered one of the most difficult problems because of the rise in unusual symptoms and the volume of data on patients with various diseases. The way healthcare management is carried out and documented has changed as a result of recent technological advancements.

More than 12 million people worldwide die each year from heart, diabetes, and cancer-related diseases, according to the World Health Organization (WHO). Relatively, this number is high in all nations, particularly in emerging nations. A statistic states that any one of the aforementioned diseases causes a causality every 30 seconds. The task of diagnosing these diseases is both necessary and challenging for each nation's healthcare department. Because patients are unaware of the disease's symptoms, they are unable to keep track of its severity or other health issues.

1.2 IoT in Healthcare

A network of physical devices like desktops, laptops, smartphones, tablets, and so on is known as the Internet of Things (IoT). Sensors, software, and other technologies are embedded in these Objects so that they can exchange data with other systems and devices via the Internet. With IoT-enabled devices, remote monitoring and disease prediction in the healthcare industry is now possible. This can keep patients safe and secure and motivate doctors to provide superior treatment. IoT devices are quickly integrated with AI and machine learning into disease prediction systems and process medical data for accurate disease diagnosis. By redefining the space of devices and human involvement in the delivery of healthcare solutions, the Internet of Things (IoT) is undoubtedly transforming the healthcare industry. Additionally, IoT-enabled disease prediction and remote monitoring of patients have a significant impact on reducing consultation time, minimizing healthcare costs, and improving disease prediction accuracy. Coming up next are a portion of the primary advantages of IoT in medical services:

More Effective Treatment: It permits specialists to make proof-based, very much educated choices while giving total responsibility.

Reduction in costs: The Internet of Things enables real-time patient tracking, which reduces unnecessary hospital stays, doctor's visits, and readmissions

Quickly Diagnose: Doctors can diagnose diseases early, even before major symptoms appear, by utilizing continuous patient monitoring and real-time data.

Preventative Health Care: Proactive medical treatment can be provided with continuous health monitoring.

Management of Medical Supplies and Drugs: The management of medical supplies and medications is a significant challenge in the healthcare industry. These are handled and used effectively by connected devices, which results in lower costs.

II. Literature Survey

Society's recent concern is made sense of in this part. A candy machine may sell or provide General Deal Rundown (GSL) prescriptions, which are those that can be purchased from common retail outlets like general stores, under the meds regulation. A creative candy machine that fills prescriptions will make life a little easier. Clients will want to get essential over-the-counter (OTC) medications at any time (24 hours a day, 7 days a week). Minor illnesses have an odd way of luring people in when pharmacies have already closed in the middle of the night. In contrast to prescription medications, over-the-counter (OTC) drugs are

sold directly to the consumer without a doctor's prescription. Prescription drugs can only be sold to consumers with valid prescriptions. People will be able to get medicine even at night thanks to this machine. The user can receive immediate first aid with this..

III. Proposed System

As in the fig 1.1 all the sensors – temperature, ultrasonic, weight, heart rate, and blood pressure sensor are connected to the PIC16F877A microcontroller. To view the patient's details, the PIC16F877A microcontroller is connected to the LCD.

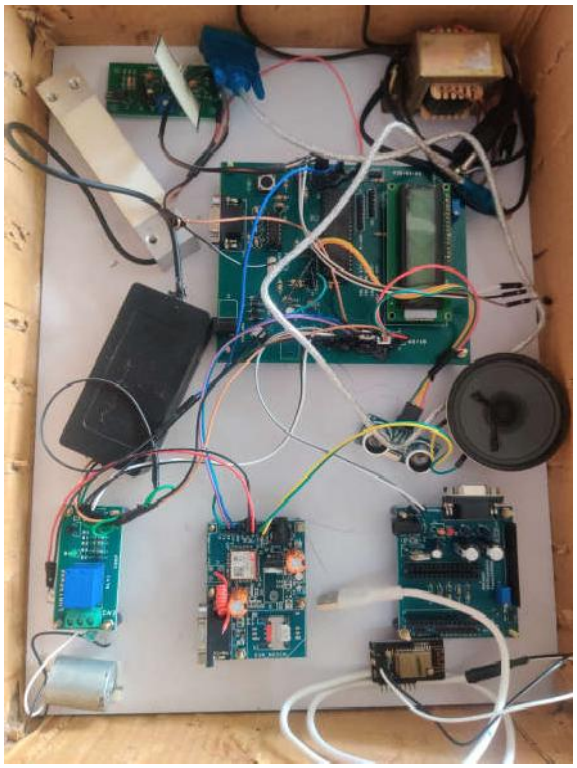

Fig 1.1 Proposed system

In the beginning, the patient will undergo an initial check-up and the data will be sent to the doctor via IOT. The doctor can view the data in real-time using. Clicking the call doctor option connects the patient with the doctor if they need to speak. Then, he will prescribe the medicine that will be shown on the monitor. A *single-channel relay* is an electronic switch that can be controlled by a low-power electrical signal A single-channel relay controls the motor, which controls the opening and closing of the medicine dispatcher. The IoT module is for receiving and transmitting information from users and doctors. Mic is used for communicating with doctors and Speaker is used to hear doctor's consultations.

3.1 Web Application

Fig 1.2 is a web application used by doctors to obtain patient health information and can only be accessed by the admin. It offers live health information to doctors.

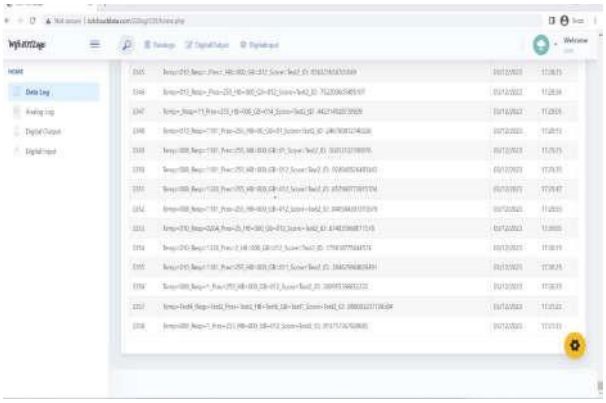

Fig 1.2 Web application for doctors

3.2 Patient's Monitor

Fig 1.3 is user interface application that displays the patient's recorded information, allows live communication with the doctor, and displays the prescribed medication and its intake timings.

Fig 1.3 Patient's monitor in medical ATM

IV. Software Requirement

- Language: C Language
- Compiler: MP LAB IDE
- Operating System: Windows

V. Hardware Requirement

- PIC Microcontroller
- Heart Rate Sensor
- Load Sensor
- Blood Pressure Sensor
- Ultrasonic Sensor
- Temperature Sensor
- SD card-based Audio Device
- Speaker
- LCD
- Power Supply
- UART
- Pc or Monitor

VI. Block Diagram

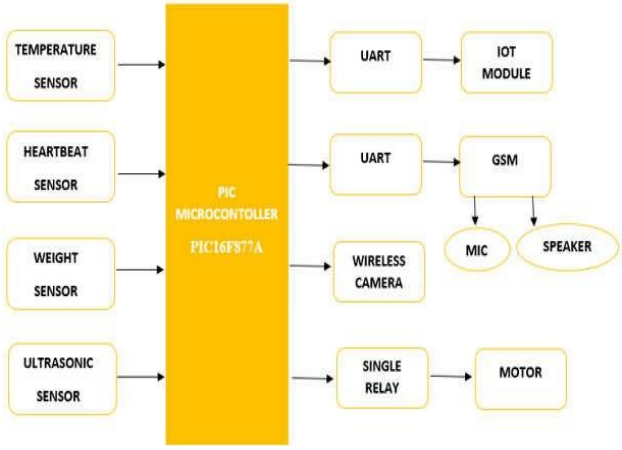

Fig 1.4 Block diagram of Proposed System

PIC16F877A microcontrollers are electronic circuits that can be programmed to do a wide range of tasks. Microchip describes the PIC16F877A, a 40-pin (DIP) microcontroller with an instruction speed of 200 nanoseconds, as powerful.

The temperature sensor is utilized to quantify the internal heat level of the patient. At the point when the patient contacts the sensor, it recognizes the internal heat level.

The patient's heart rate is measured with a heartbeat sensor. Photoplethysmography is the foundation of the heartbeat sensor. It measures the change in light intensity that occurs when light passes through any organ of the body as a result of the change in blood volume.

A weight sensor is used to measure the patient's weight. In this case, it changes an information mechanical power like a heap, weight, strain, pressure, or tension into an electrical result signal that can be estimated, changed over, and normalized.

An ultrasonic sensor is an instrument that measures the distance from an object by making use of ultrasonic sound waves. In this device, it is used to measure the patient's height.

A painless sensor for measuring blood pressure is the Blood Pressure Sensor. It measures the mean arterial pressure, diastolic pressure, and systolic pressure with an oscillometer.

The IoT module introduces the Internet of Things, which extends Internet connectivity beyond computers and related devices to other physical devices or common objects. It is utilized to get and communicate client and clinical data.

An all-inclusive nonconcurrent recipient transmitter is utilized for the trading of sequential information between two gadgets. The IOT module is connected to it.

VII. Advantages

Accessibility: Medical ATMs are designed to be located in convenient and accessible locations such as shopping malls, airports, and community centers. This makes it easier for people to get the medical attention they need, especially in areas where there are few or no medical facilities.

Convenience: Medical ATMs provide patients with the convenience of receiving medical care without having to visit a hospital or clinic. Patients can access the medical ATM at any time of the day, making it ideal for people with busy schedules.

Cost-effective: Medical ATMs are cost-effective compared to traditional medical facilities. They help reduce the cost of medical care by providing affordable services to patients.

Time-saving: Medical ATMs help save time by providing quick access to medical care. Patients do not have to wait for long hours in queues or appointments as they can receive medical attention in a matter of minutes.

Confidentiality: Medical ATMs provide a confidential environment for patients to receive medical care. Patients can discuss their health issues without fear of being overheard by others.

VIII. Conclusion

From this concept, we conclude that the automated medication dispenser using a telemonitoring system is technically feasible for humans. It is based on a PIC microcontroller with GSM service. It enables the constant availability of medicines and doctors, even in rural areas, and is very helpful. It also allows easy access. The automatic medicine dispatcher using the telemonitoring system is a promising solution to improve medication adherence and patient outcomes. The integration of telemonitoring technology allows for remote monitoring of patients' health conditions, and the automatic dispenser ensures timely and accurate medication delivery. This system can help address the challenges of medication non-adherence, particularly among patients with chronic conditions, and improve patient health outcomes while reducing healthcare costs. Furthermore, the system must be user-friendly and accessible to patients of all ages and technology proficiency levels.

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