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Advanced Medibot For Medicine Dispensing and Health Monitoring

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***Abstract*— When we are considering the marginalized community the major problems faced by them are lack of education, poverty, malnutrition, lack of proper medication, lack of money, etc. This paper has proposed a system for proper medication and monitoring of the health of marginalized communities so that the quality of their life can be enhanced. This paper suggests a Smart Medical device that can automatically dispense the medicine at the prescribed schedule, monitoring the health, and dispensing sanitizer and mask. The Advanced Medibot consists of a pulse oximeter, heart rate sensor, and temperature sensor to monitor the user's health conditions. When these values are abnormal then the device sends a message to the nearest doctor with the patient's details with the help of the GSM module. It can dispense daily supplementary medicines like iron, vitamins, etc., and alert the user with the help of a buzzer. It is also capable of receiving voice commands from the user. If we need any medicine, just say the name of the medicine or the name of the disease to the device then it will dispense the corresponding medicine. It can also dispense sanitizer and mask through voice commands. This device can be trained using any language. This feature helps uneducated or people who lack knowledge in medicine from the consumption of wrong medicines. If there is an emergency that arises, the patient can press the emergency button provided on the device which will inform the nearest ambulance service and the corresponding doctor with patient details. The objective of this paper is to introduce technologies to the marginalized community to enhance their quality of life.**

Keywords*— *Smart medical device, Advanced Medibot, marginalized, medicine dispenser, health monitoring, voice commands, emergency, expiry, IoT.

I. INTRODUCTION

As people get busier these days, they forget to take their medicines at the prescribed schedule. Medications keep them healthy, but complex medication schedules can lead to mistakes like missing doses, taking incorrect amounts, or taking medicines at the wrong times. These mistakes could lead to unwanted doctor or hospital visits, illness, and even death [1]. When we are considering marginalized groups, they are even more vulnerable because of lack of education, poverty, malnutrition, lack of proper medication, etc. So, we need a smart device that will help us to take proper medicines at the prescribed time and monitor our health conditions regularly.

The Advanced Medibot is a medical assistant which helps us to take proper medicines at the prescribed time and it monitors our health conditions regularly. This device can automatically dispense proper medicines at the correct time as prescribed by the doctor and alert us using a buzzer. It can also dispense medicines by voice commands suppose if we have a fever then we just say the keyword ‘fever’ to the device then the device dispenses the corresponding medicine for fever. The Advanced Medibot can be trained in any language, for example, we can say ‘pani’ (Malayalam word) instead of fever. This feature helps uneducated or people who lack knowledge in medicine from the consumption of wrong medicines. This device is also able to dispense sanitizer and mask through voice commands which keep them hygienic and prevent the spreading of diseases. It can monitor the heart rate, oxygen in the blood, and temperature. If the measured heart rate, oxygen in the blood & temperature are abnormal then the device sends a message to the doctor with the address of the patient with the help of the GSM module. Suppose only the temperature of the patient is high, the device dispenses medicine for fever. If there is an emergency that arises, the patient can press the emergency button provided on the device or through voice command by using the keyword ‘help’ which will inform the nearest ambulance service and the corresponding doctor with patient details. Other features of this device are it can dispense first aid kit for wounds, dispense daily supplementary medicines (like iron, vitamin tablets), medicine expiry alert, refill indication, IoT functionality, etc. This device is also a great companion for aged people to take their medicine without the help of others. The Advanced Medibot can be used in homes, hospitals, etc. during pandemic situations (like corona, nipha, etc.), and can we prevent direct human intervention during giving out medicine to patients by using the IoT functionality of the device hence we can reduce the spread of communicable diseases.

II. LITERATURE SURVEY

In ancient times, medicines are given by humans to the patients. Due to climatic and lifestyle changes the rate of patients increasing day by day. People are busy with their work, so they forget to take their medicine at the prescribed time, and sometimes this leads to the consumption of the wrong medicine which affects our health. So, people began to think about smart medical devices. In earlier days, people use alarms on the clock for reminding the medicine time. Later, they began to use a medicine alerting system that helps disabled people who are unable to take their medicine on time. This is helpful for those who are lazy and forgets to take medicine on time. The buzzer will irritate them to take

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medicine on time. Authenticity is given in the system hence no other unauthorized person can take the medicine; hence medicine cannot go into the wrong hands. This system helps people to take medicine on time [2]. Then Automatic medication dispenser is introduced which is designed specifically for users who take medications without close professional supervision. It relieves the user of the error-prone tasks of administering the wrong medicine at the wrong time. The major components of this medication dispenser are a microcontroller interfaced with an alphanumeric keypad, an LED display, a Motor Controller, an Alarm system, a multiple pill container, and a dispenser. The user is required to press a button to get the pill [3]. Later IoT based Automated Medicine Dispenser is introduced which has a lot of different functions [4]. Then IoT-Based Smart Health Monitoring System comes into practice during the pandemic situation [5] and this system is combined with an automatic medicine dispenser to form advanced medical devices. When we are considering the marginalized community they even don't get proper medication. Most of the healthcare services are not fulfilled for these communities. So, the introduction of smart medical devices mentioned above can enhance their life. But due to lack of knowledge, they face difficulties to operate these devices because it requires some manual settings for proper dispensing of the medicine. This paper proposed a system that is the advanced version of all the smart medical devices available today. The Advanced Medibot can be controlled by voice commands in our native language, which is also capable of medicine dispensing, health monitoring, and a lot of other functions which is helpful for people who are uneducated or lack knowledge in medicine.

III. DESIGN

The design of the Advanced Medibot is shown in Fig 1. The entire system of this device is enclosed in a rectangular cabin made of multi wood. There are separate slots for receiving medicine, mask, and sanitizer. It consists of three openable doors placed at the top, right, and backside of the device. The door provided on the top of the device is for refilling the medicine, mask, and sanitizer. The door provided on the right side of the device is for measuring the oxygen saturation, heart rate, and temperature. The door provided on the backside of the device is for maintenance of the electronic circuits.

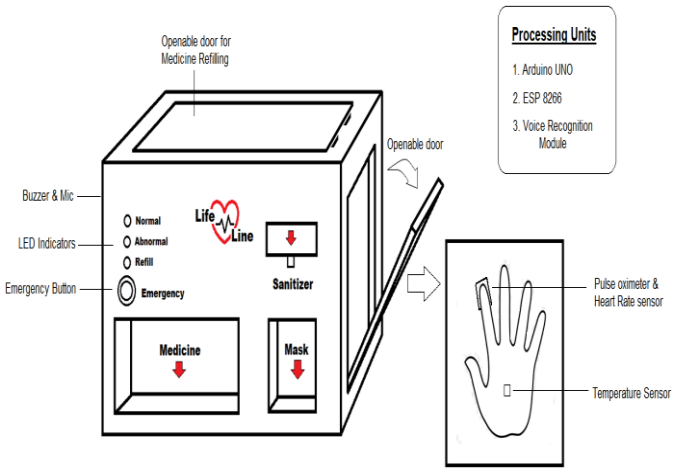

Fig 1: Design of Advanced Medibot.

IV. PROPOSED SYSTEM

The Advanced Medibot is an IoT-based voice-controlled medicine dispensing and health monitoring system. It uses NodeMCU which is the brain of the system. NodeMCU consists of an integrated ESP8266 Wi-Fi module that enables the IoT functionality in Advanced Medibot. It processes signals from the pulse oximeter, heart rate sensor, temperature sensor, voice recognition module, push-button, and controls servo motors, pump, LEDs, buzzer, and GSM module.

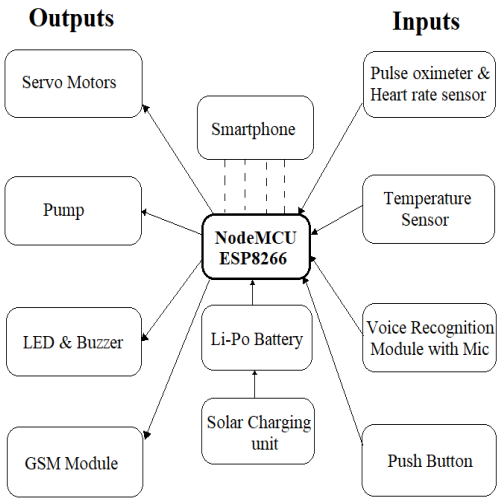

Fig 2: Block Diagram of Advanced Medibot.

NodeMCU can be connected to a smartphone via the internet. By using the Blynk application we can receive notifications from the device and can we control the device using a smartphone.

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Fig 3: NodeMCU.

MAX30100 is the pulse oximeter and heart rate sensor used in this device. It can measure the oxygen saturation (SPO2) of hemoglobin in the blood and heart rate continuously.

Fig 4: MAX30100.

The temperature sensor used in this device is LM35 which can provide the accurate temperature of the body. The data from MAX30100 and LM35 are processed by NodeMCU. If the processed value is abnormal then it sends a message to the nearest doctor with patient details with the help of the GSM module.

Fig 5: LM35

The voice recognition module is used to recognize the voice commands from the user. It can be trained up to 80 commands. When this module receives a voice command, it checks with the pretrained voice command and sends data to the NodeMCU appropriately. This module can be trained in any language.

Fig 6: Voice Recognition Module.

Push-button is used as the emergency button which informs the nearest ambulance service when it is pressed in case of emergency. Servo motors are used for dispensing medicine and mask according to the signals received from the sensors and voice recognition module. A pump is used for dispensing sanitizer. LEDs are used for visual indications like normal, abnormal, and refill. A buzzer is used for indicating the abnormality in the measured value and expiry of the medicine.

Fig 7: GSM Module.

GSM module is used to send details of the patient to the doctor or ambulance service according to the data from different modules. The entire system is powered by a Li-Po battery. The battery can be charged using solar.

Fig 8: Servo Motor

V. FUTURE SCOPE

Advance Medibot has a greater scope in the future because people are getting busier day by day, so they forgot to take proper medicines at the correct time, so they need this kind of smart device for correct medication and health monitoring. This device is also a great companion for aged people to take their medicine without the help of others. This device can be used in homes, hospitals, etc. during a pandemic situation and reduce the spread of communicable diseases. There is a lot of

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medicine dispensing devices available in the market, but they only have medicine dispensing functionality and they require some manual setting for the proper dispensing of medicine. If we consider marginalized groups majority of them are uneducated so they face difficulty in setting the device. The Advanced Medibot can be easily operated by voice commands using their native language and it can monitor the health conditions of the user. So, this kind of device has a great market in the future.

VI. COST ESTIMATED

TABLE 1.

Sl No.	Components	Qty.	Price
1	NodeMCU	1	340/-
2	MAX30100	1	199/-
3	LM35	1	79/-
4	Voice recognition module	1	2000/-
5	Push-button	1	10/-
6	Servo motor	4	840/-
7	pump	1	120/-
8	LED	3	10/-
9	Buzzer	1	79/-
10	GSM module	1	300/-
11	Li-Po battery	1	2500/-
12	Solar panel	1	1649/-
Total			8126/-

VII. ADVANTAGES

- It can automatically dispense proper medicine at the prescribed time.
- It can monitor oxygen saturation, heart rate, and temperature and inform the doctor if necessary.
- It can dispense sanitizer and masks which will be helpful during the pandemic time to prevent the spread of diseases.
- It can recognize voice commands and can be trained in any language.
- Human error can be reduced.
- It can be charged from a solar panel so it can be used in rural areas where there is no electricity.
- It can dispense first aid kits and daily supplementary medicines.
- It can be controlled or monitored by a smartphone.
- It can alert the user about the expiry of the medicine and refilling of the medicine.

VIII. DISADVANTAGES

- The medicine should be refilled manually by a medical practitioner. This can be overcome in future development.
- It requires regular maintenance and firmware updation.
- It requires a good cellular network for sending emergency messages.
- Bulkier size and cost are comparatively high.

IX. CONCLUSION

In this rapidly growing world, with the increased rate of patients and the evolution of new viruses which are deadly in nature, people need this kind of device so that they can avoid unwanted hospital visits hence being infected by communicable diseases can be prevented. This proposed system helps all the people including marginalized groups to improve their quality of life and health status. This kind of device gives new hope in the minds of people to tackle a situation like this, especially during pandemic times. It helps people to take the proper medicine at the proper time as prescribed by the doctor and monitor health to take necessary precautions which will keep them healthy and prevent unnecessary doctor or hospital visits and save their time & money.

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