Any-time Portable Pharmacy Machine (APP)

DR. R.V. SHALINI [1], SUDESHNA. H [2], MARIYADAVIDPRAKASH. P[3], SURYA NARAYANAN[4], GANESHAN B[5]

[1]*Associate professor, Department of Biomedical Engineering Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu*

[2,3,4,5]*Third Year Student, Department of Biomedical Engineering Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu*

Abstract*—There are numerous remote and underdeveloped regions where access to pharmacies is limited or nonexistent. People in remote areas without pharmacies may struggle to obtain necessary medications, leading to untreated illnesses or worsening health conditions. This model plays the part of a drug store and a pharmacist. It fundamentally collects the information of the understanding who works this prototype which includes age and gender of the patient .The essential health parameters like SPO2 ,temperature, and heart rate is eventually collected from the patient .There's certain data set up done in this model such as a list of disease and its common symptoms and the medications to be given based on the symptoms. The patient's symptoms and fundamental information is collected by key pads while the questions are shown within the display board and to the other end of this model there's a pill vending machine .This vending machine is designed utilizing 3D software with the opening and closing of the vendor done by the steppers motors. These machines typically operate 24/7 and can be found in different areas such as transport stands ,railroad stations, remote areas, hostels, huge buildings with high rated populations and within the regions in need of pharmacy. They usually offer a range of commonly used medications for minor ailments like coughs, colds, and fever. The process of machine learning play key aspect in analysis of the patients disease condition and the apt medicine is delivered similarly what a pharmacist or a doctor would prescribe. Ensuring the security of the patient on the off chance that if the symptom continue for more days even after the prescriptions is done. The machine prefers to visit the doctor immediately.

***Index Terms*—Remote areas, Pill vending machine, Machine learning, 3D Software.**

I. INTRODUCTION

Pharmaceutical treatment is an important part of the spectrum of health services. Pharmacists are part of the healthcare team and counsel patients and advise nursing staff and case managers. The lack of pharmacies in remote areas is a serious problem that affects people all over the world. This problem is often exacerbated by factors such as geographic isolation leading to transportation difficulties, limited infrastructure leading to limited storage facilities, shortage of health workers and also lower population density. In rural India, 63% of people could not reach a pharmacy within 5 kilometers. In rural India, the ratio of pharmacists to patients is much lower than recommended. The report highlights a ratio of 1 pharmacy per 4,000 inhabitants, well below the WHO standard Times of India - Gaps in access to medicine in rural India.

The lack of pharmacies in remote areas affects the health and well-being of residents. The number of pharmacies located in remote areas leads to limited availability of medicines. This means that without nearby pharmacies, people in remote areas can struggle to get essential medicines. This can also lead to delayed treatment, which is the distance to the nearest pharmacy, can lead to delayed treatment of acute health conditions, which also leads to increased health costs, which residents of remote areas can cause higher health costs due to long distances. . access to pharmacy services. This shortage would have a greater impact during emergencies, such as natural disasters or public health emergencies, the lack of nearby pharmacies can prevent the availability of life-saving medicines and supplies, which ultimately leads to an improved quality of life. Innovation from pill makers can offer hope to remote areas with limited access to pharmacies, resulting in 24/7 availability, reduced travel times and costs, faster service and lower operating costs. This prototype, which mainly focuses on the role of pharmacists without their presence, effectively improves people's quality of life. This is achieved by collecting basic patient data and biological data such as SPO2, the patient's heart rate and temperature and .The main board with some

matrices built into it containing the sponsored pills for the identified symptom is delivered by a vending machine. head, which is primarily designed to deliver cold, cough and fever pills after examining machine learning. Machine learning, where patient information is identified through data analysis, shapes the information collected from the patient. This is how the right medicine is delivered. This machine also gives the patient an alarm if symptoms persist for several days before a doctor's visit. Healthcare advisors are consulted on the prepared matrix before it is built into the software. This prototype offers a potential solution to address the pharmacy access gap and can be used as a valuable tool to improve access and convenience to healthcare in remote areas.

II. LITERATURE SURVEY

2.1. Pharmacy management system

Sivaprakash et al., 2022 Pharmacy management system application that helps the pharmacist to manage the pharmacy systematically. The pharmacy management system can simplify the work by providing medication information when entering their name. The computer displays medication information such as the amount of medication and the medication's expiration date. In large pharmacies, it is very difficult to handle the details of all the drugs manually, so we can keep track of all the drugs using this pharmacy management system. It is filled with information every time new drugs are imported and given a searchable expiration date.

2.2. Tele pharmacy—Enabling Technology to Provide Quality(Pharmacy Services in Rural and Remote Communities)

Michael B Kimber et al., 2006 The delivery of quality pharmacy services in rural and remote communities is affected by the National Medicines Quality Strategy. The implementation of this strategy is challenged by the lack of pharmacies in rural areas. In this respect Australia is at a disadvantage compared to the UK and the US. The fourth Community Pharmacy Agreement between the Australian Federal Government and the Pharmacy Guild commits the parties to 13 key objectives and provides funding initiatives for professional pharmacy programs.

2.3. Touch Screen Based Anytime Medical Vending Machine

Abhishek Singh et al., 2015 Technological development is rapid from microelectronics to nanotechnology; from cell phones to flip phones, everything has changed to great changes in ideas and innovations. Many new systems have been introduced to facilitate our daily operations, industrial and medical flow. There are no hospitals or medical facilities in such places. This is where the advanced system comes into play. There are many drugs in the market that can help in such a situation, but since they are not available at the same time, they can cost lives. The advanced system idea involves the development of a touch-screen medical vending machine for use in remote locations that provides first-line medications based on symptoms and reports the availability of nearby hospitals, doctors and ambulances..

2.4. Smart Vending Machine Counter using IoT

Athir Jaafar et al., 2020 Vending machines (VMs) usually operate in places such as public transport platforms, stadiums, highway rest areas or shopping corridors. These types of locations create problems for IoT solutions that rely solely on the cloud for data processing. In a smart VM, the user can order products using a smartphone without interacting with the vending machine in this system. At the same time, adding intelligence to a machine increases complexity.

2.5. Fever, fever patterns and diseases called ‘fever’—A review

Dimie Ogoina et al., 2011 Fever is one of the oldest clinical signs of disease in the mammalian host and one of the most common reasons for medical consultation worldwide. Fever often occurs in response to infection, inflammation and trauma. However, this view of fever is only an oversimplification, as increasing evidence now indicates that fever represents a complex adaptive response of the host to various immune challenges, whether infectious or non-infectious. The body temperature remains within normal regulated limits with the help of a sensitive substance. balance between heat loss and heat gain.

2.6. Cough hypersensitivity and chronic cough

Kian Fan Chung et al., 2022 Chronic cough is common worldwide in all age groups. This disease is difficult to treat because many pulmonary and extrapulmonary conditions can cause chronic cough, and cough can

occur without an identifiable underlying cause or be refractory to therapy that improves underlying conditions. Most patients with chronic cough have cough hypersensitivity, which is characterized by increased nerve sensitivity to various stimuli that affect the airways and lungs and other tissues innervated by nerves of the common nervous system .

2.7. The Common Cold

Bennett Lorber et al.,1996 The common cold occupies an almost unique position in infectious diseases, because everyone knows what it is from personal experience. As Supreme Court Justice Potter Stewart said about obscenity, "I know it when I see it But, although we all know what the common cold is, it is hard to define. In most definitions it is described as an acute inflammation of the mucous membranes of the respiratory passages, particularly of the nose, sinuses, and throat, caused by viruses and characterized by sneezing, rhinorrhea, coughing, and so forth.

2.8. Automatic Digital Pharmacy

B. C. Supreeth Chowdar et al., 2020 According to a study by the World Health Organization, about 65% of the population is addicted to drugs on a daily basis. Medicine plays an important role in people's lives in all situations because health-related problems have increased due to unhealthy lifestyles that many have been following in recent years. This machine is designed to provide health services in areas where drug trafficking may not be feasible or possible. It allows the user to select a drug, pay the required amount, then check the amount received and dispense the drug

2.9. Any Time Medicine (ATM) Vending Machine

for Medicine Self-Dispensing

Y. G. Usha et al., 2020 Medicines are a very important aspect of overall human well-being. They are important for maintaining health, preventing disease, treating chronic diseases and curing diseases. But current social status has created many health inequalities. This project helps provide medicines for common health problems as well as emergency care. It shows the available drugs so that the user can choose the drugs according to their needs.

III. BLOCK DIAGRAM

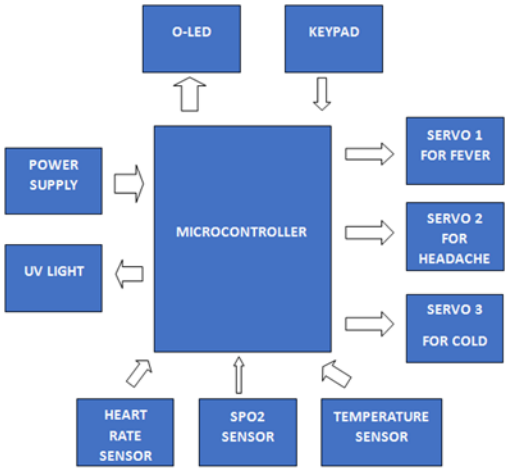

Figure 3.1 Block diagram of ATM

IV. HARDWARE DESCRIPTION

4.1 Arduino UNO:

Control System: The Arduino Uno acts as the central controller of the instrument hub, coordinating all its functions. It manages user inputs, communicates with sensors, controls the dispensing mechanism and ensures the correct operation of the machine. The Arduino Uno controls the servo motors or other actuators responsible for dispensing the pills from their storage chambers. It ensures accurate dispensing according to the user's choices and manages all security functions related to the dispensing process.

Figure 4.1 Arduino UNO

4.2 Keypad: A keypad is an input device that allows users to enter data or commands by pressing buttons on a grid. In Arduino projects. Here, the input signal is taken from the keyboard when the patient answers the questions that is displayed on the screen.

Fig 4.2 Keypad

4.3 Servo motor: The function of the servomotors is to collect the signal from the software and act to dose the correct drug for the detected symptom. Servo motors can be integrated into security mechanisms to prevent unauthorized access to pill boxes or to secure the dispensing mechanism when not in use.

Fig 4.3 Servo motor

4.4 UV light: The UV spectrum range of 320-400 nm is used for disinfection. Here is a UV LED 360-400nm to disinfect the sensor after each patient use

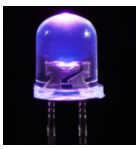

Fig 4.4 UV light

4.5 Speaker: The speaker is trained to translate the text into sound so that patients can understand and answer the symptom questionnaire

Fig 4.5 Speaker

4.6.Display or Output: Here, the OLED screen is used to display the symptom interrogation, and the collected biological reading is displayed on the OLED screen.

Fig 4.6 OLED display 0.91’’

4.7 SPO2 sensor:

Heart rate and oxygen saturation are key factors in determining a patient's normal health status. Fluctuations in the determined SPO2 level may indicate that the patient has a cold or cough..

Fig 4.7 MAX30100 Sensor for SPO2 and heart rate

4.8 Temperature Sensor

An Arduino temperature sensor is a device that measures temperature and converts it into a readable form that can be processed by the Arduino microcontroller. Here, a DS18B20 sensor is used, which is waterproof and is placed in the patient's armpit.

Fig 4.8 DS18B20 Temperature sensor

V. PROCEDURE

1. Initial collection of basic biological data of the patient. This biological data includes (SPO2, temperature and heart rate)

2. Learn about the patient's condition through basic questions asked to identify the disease condition.

3.A Basic data analysis is performed comparing the disease state defined in the algorithm.

4. The result after the analysis is signalized to the pill delivering potion.

5. This system is designed to dispense the correct amount of medication, ensuring the correct delivery of the required amount of medication.

6. The system recommends visiting a doctor even if the illness lasts more than a certain time.

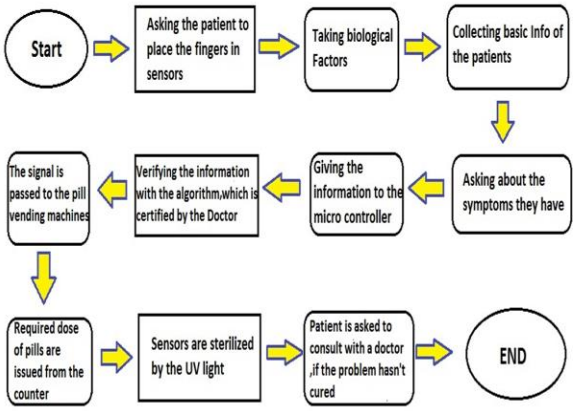

Fig 5.1 Workflow of the APP machine

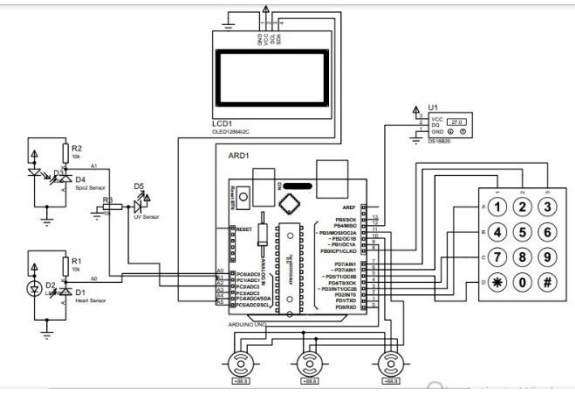

Fig 5.2 Circuit Diagram of APP machine

VI. WORKING METHODOLOGY

Selection of sensors: Next, the sensors used to determine the parameters of the human body are selected, among which SPO2 and heart rate are monitored by the MAX30100 sensor, while the patient's temperature is collected by the temperature sensor DS18B20 and placed on the arm area or under the armpit, this sensor is used to prevent water resistance.

Data collection: Basic questions such as (age, weight, male/female, pregnant/not. Confirm if the patient has abnormalities such as heart disease. Collect biological data such as temperature, blood pressure, SPO2 and BPM. Biological data and symptom). data is entered into the responsible in the processor.

Data analysis: Biological data and symptom details are entered into the controller. The following data analysis is performed on the embedded matrix. sensor signals must be processed. This process usually involves modifying the signal. Use machine learning, where the constructed algorithm is embedded into the software. It plays a role in identifying the patient's symptoms. The analysis is done by taking 60% of the symptom confirmation by the patient symptom and 40% of the data by the monitored biological parameter. Before feeding the matrix to the software, The matrix is consulted with a health care professional to ensure a safety analysis to describe the appropriate medication for the identified symptom.

Pill Vending: 3D shaped vending machine designed considering the size, density and volume of pills to be stored. According to the signal from the sensor and the data collected by the patient, the corresponding service must be used to receive the corresponding drugs. Before feeding the matrix is consulted with health care professional for ensuring the safety analysis to describe the apt medicine for the identified symptom.

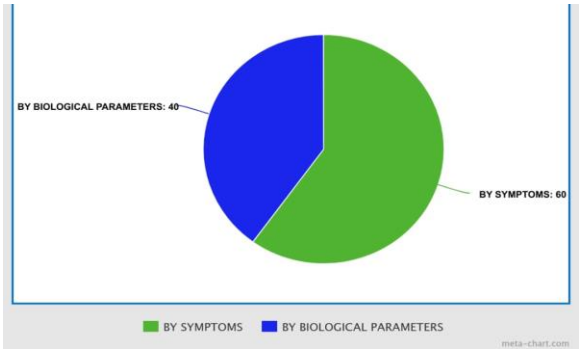

Fig 6.1. Data analysis for symptom identification

VII. RESULT

The main goal of this project is to make medicines available to everyone, regardless of their location. This model works as an APP style vending machine. At the APP, the counter is short of money; however, in this case, the user receives pills according to his specific needs, acting as both a pharmacist and a doctor.

CONCLUSION

One notable deviation from the original system is that people might use it to obtain prescriptions in public locations such as malls, hostels, train stations, parks, and areas where medical stores are restricted. People receive appropriate medical care and primary aid therapy by doing this, which saves time.

FUTURE SCOPE

To improve the quality and ease of use of this model, additional treatments for other diseases such as indigestion, skin diseases, headaches etc. are added to this model. Make it commercial by including the payment process online. Touch screens are designed to be convenient for users. Monitor the availability of medicines through mobile applications. Cloud configurations with enough stored data should be made to monitor the actual status of pill demand from a vendor and also store patient information. In order for the machine to work properly, a weekly automatic calibration must be installed.

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