Web Based Application for Healthy Lifestyle

D K Bharath Reddy, M Aswartha Reddy

Under the guidance of:

Prof. Veena Gadad,
Assistant Professor, R V College of Engineering, Bangalore

Ms. Sindhu Rajendran
Assistant Professor, R V College of Engineering, Bangalore

Abstract

A healthy lifestyle is very important for human beings. Work pressure, environmental factors, lifestyle, food intake, etc. are some of the main challenges in maintaining a healthy life. These challenges became worst during the pandemic due to the Covid-19 virus. Nowadays due to hectic work from home schedule, health management, regular exercise and even doctor consultation on time has become a challenging task. Nowadays technology is a part of every sector including health monitoring. In order to make a robust smart health monitoring system, in this study Web-Based health monitoring application is proposed to provide different user-friendly interfaces that allow users to track all the information regarding their health. The application uses LogMeal API (Application Programming Interface) and RFID (Radio Frequency Identification) cards to provide the daily and weekly wise nutrient values in the food consumed by the user. Google Charts is integrated with the application to give a graphical representation of their nutritional content on a daily as well as weekly basis. This helps the dieticians to suggest proper food for the users, and also to track the food consumed by them. Management of dieticians' appointment scheduling through the application helps to reduce the workload of users as well as dieticians. The application also allows the dieticians to access previous medical reports of patients by scanning a one time QR-Code. , this facility secures the patient medical report from unauthorized access. Tablet Remainder hardware model is proposed to help users to take their tablets on time.

Keywords:

Nutrient, QR-Code, LogMeal API, RFID cards and Auth0, Appointment Scheduling.

I. Introduction

In recent years, the world is witnessing huge health-related challenges. Millions of people worldwide are facing health problems like obesity, heart disease, nutrient, vitamin and calcium deficiency, cancer, weakness, etc [1]. The main reason for this are: eating junk food, overeating, lack of fitness and an unhealthy lifestyle. Before Covid 19, due to a heavy workload, lack of exercise and unhealthy food, most of people failed to keep good health. From the time Covid 19 hit, people become more conscious to take care of their health by managing diet plans and exercise [2].

As the number of people with health problems is increasing alarmingly day by day, more people are visiting hospitals, as a result of which, there are long lines at the hospital for check-ups, scans, and tests. With patients visiting multiple hospitals for different checks ups, managing all the files is becominga tedious process for the healthcare community, and this may result in the loss of certain crucial files or prescriptions.

Very less number of user-friendly health monitoring applications or websites are currently available to provide all information in one eye glance [3]. Currently there are no application which provides all of the following facilities in one single application,

- Tracking exercise duration,
- Type of healthy food the user has to take.
- Automatic notification regarding the percentage of nutrients consumed daily and weekly wise.
- Automatic scheduling of doctor/dietician appointments.
- A notification facility for the patients as a reminder regarding the medication from time to time and how much they eat still does not exist.

The main aim of this project work is to provide an interactive and user-friendly health application/website. With this application/website people can accurately track the food they eat along with the nutrients present in it. Based on the track of nutrients consumed by the user, the application encourages the user to work out and exercise daily to keep themselves fit and healthy. The registered dieticians/doctors can track the percentage of nutrients consumed by the patients thereby enabling the dieticians/doctor to suggest healthy food tips, exercise and medication. The project also focuses on providing users interface to schedule their appointments according to their convenience. Users can securely store their medical reports/scans/prescriptions on cloud securely. Registered doctors/dieticians can access registered users' previous/current health records by just scanning the QR code of the user. With this analyzing the medical history of the users becomes easy for the doctors/dietician.

The implemented, application provides a one-stop solution for all healthcare needs, efficiently managing the doctors' workload and encouraging users to stay fit and healthy.

II. Statement of the problem and Objectives

Problem Statement: Monitoring health in a busy workload is challenging for most of the people. There is a need for a fully web-based automatic health monitor application that works like an assistant for the user. To develop a fully functional web-based application to track the daily and weekly wise nutrient consumption of registered users through Google charts. It allows the user to store their medical records securely on cloud, and to schedule the doctor/dietician appointment. The application should allow only the registered doctors to access the medical records of users in a secure way by scanning the QR code assigned to the user. The application provides reminder notifications to the users to take the medications on time.

Objectives:

- To track the calorie intake of the customers.
- To monitor patients' health conditions and medicine intake.
- To enable customers to monitor his/her exercise/workout.
- To enable doctors to provide the time slots during which they are available, so as to allow patients to book appointments accordingly.
- To store the records digitally

III. Background Study

Prolonged exposure to food deserts can contribute to inequalities in health outcomes [4][5]. Even though individuals can physically access healthy foods; however, additional economic, educational, and behavioral constraints can limit real opportunities for behavioral change [6][7].

The "SmartAPPetite" research project was presented in [8]. In this proposed work upfront survey, study monitoring with web analytics software, experience sampling, and follow-up surveys and interviews were considered to determine the food behavior of the participants. In the result analysis phase, a total of 208 participants were considered to carry out follow-up surveys, interviews and to determine the food behavior of the participants. These properties were used to determine the nutrient intake of participants. In [9], the study focused on the validation of dietary record apps. The diets were exclusively self-reportedin a real-life setting. The pooled results from the included validation studies showed that using dietaryrecord apps could underestimate energy and macronutrient intakes compared with traditional methods. The author [10] investigated the features and abilities to assess dietary intake among the five popular diet-tracking apps in Japan.

In [11] health monitoring system was proposed which was based on a user behavior model implemented with Complex Event Processing (CEP). JRip rule-based classifier was applied to extract the thresholds from the previous dataset to set the threshold for the current set of rules. The proposed model was tested on both hospital and activity data set. Result analysis showed that gain in accuracy of 15% for adaptive health monitoring systems as against non-adaptive health monitoring systems. The smart home development work was proposed in [12] based on the integration of fog computing with the Internet of Thing (IoT). The health monitoring system was developed with embedded data mining and fog computing. The work also facilitated distributed storage of the data and notification of services. Work was evaluated on health data of 67 patients collected from IoT smart home for the 30 days duration and achieved higher accuracy compared to the Bayesian Belief Network classifier. The IoT-based smart health monitoring system was proposed in [13]. In this architecture fog computing and IoT was integrated with the use of the health center's computers that act like servers. Connectivity among the IoT components of the smart health system was established with Long Range (LoRa) wireless communication. Users with equipped with wearable devices, medical devices and sensors were connected to servers through their computers (edge user devices). Sensed data were communicated via LoRa to the health computer for further analysis. The work carried out in [14] used machine learning algorithms for the implementation of a smart health system to monitor the daily extensive activities of registered users. The mental health monitoring system proposed in [15], model was developed to reduce the delay in the processing of the wearable sensor collected data. In [16], the health monitoring system was implemented with sensors to sense the different parameters such as heart rate, ECG, respiration rate and other sensors like GPS, accelerometer to the surrounding environmental condition of the patients. Sensor data were analyzed by the CEP model to identify any abnormality in the patient data and send the notification to the concerned caretaker.

IV. Methodology and Results

The methodology of the project is explained in detail in the Figure 1.

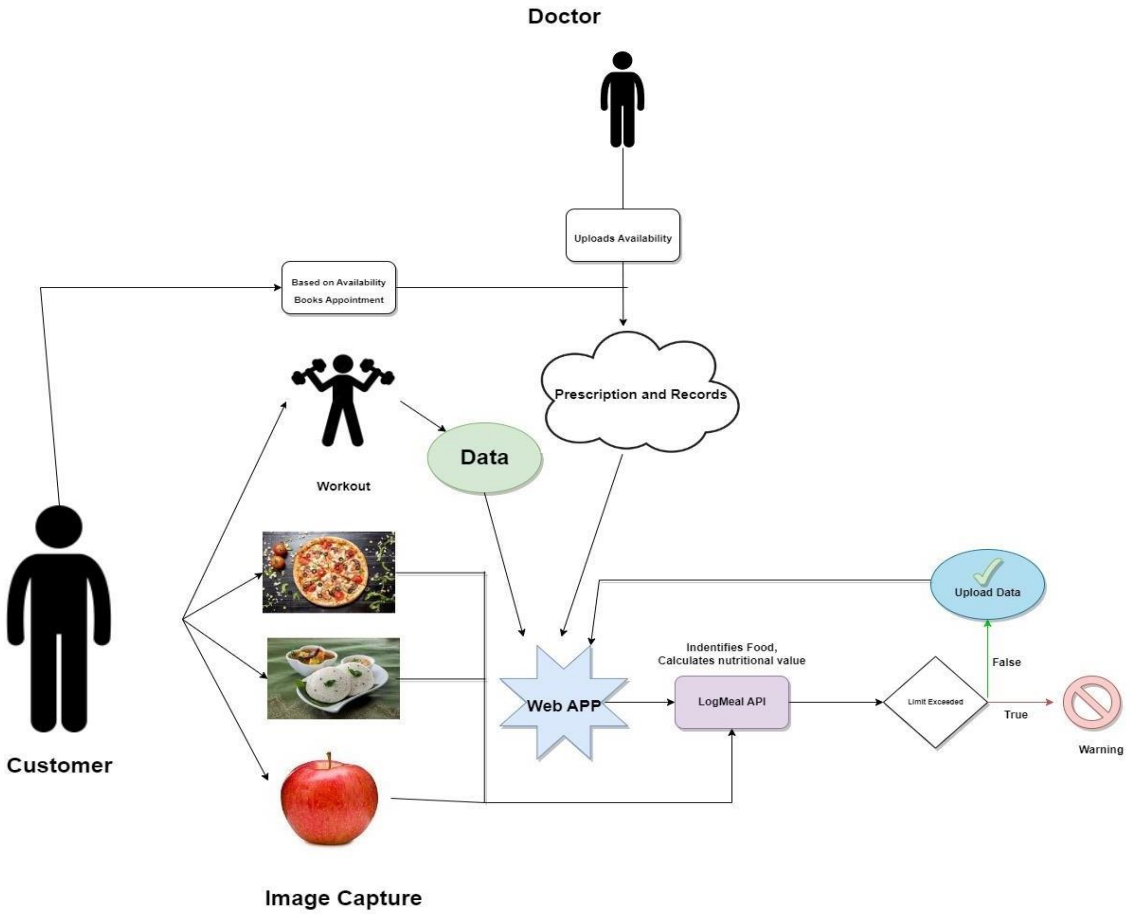

Fig. 1: Architecture of web-based health monitoring system

- Over-eating: This is one of the most common reasons for the increasing health problems, To overcome this problem, the project uses LogMeal API. The API uses machine learning algorithms to track and measure the nutritional value of the food. The user will be able to takea picture of what he is eating and upload it on the website. The algorithm process's the imageand calculates the nutritional value of the food. This information will be then displayed on thewebsite in the form of graphs and charts, inorder to allow users to interpret better since visualinterpretation is always better way of communication as compared to the traditional way. Thewebsite alerts the user if number of calories is increasing above the set limit. Eating less is not sufficient, eating healthy is important. Based on the daily food consumption of the user, the website recommends food for the users keeping in mind the amount of food consumed on thatday and how many calories still remain, so as to provide the best possible diet plan.

The figure 2 represents the interface where users enter the images of the food.

Fig. 2: Interface to add food image by user

Figure 2 shows the sample image uploaded to website. The user uploaded an image of a pizza. The website makes a request to LogMeal Api and fetches the nutritional value. The API returns nutritional value of more than 50 parameters. Calories, Proteins, Total Fats, Saturated Fats and Sugar are taken into consideration.

The figure 3, represents the dashboard of the website.

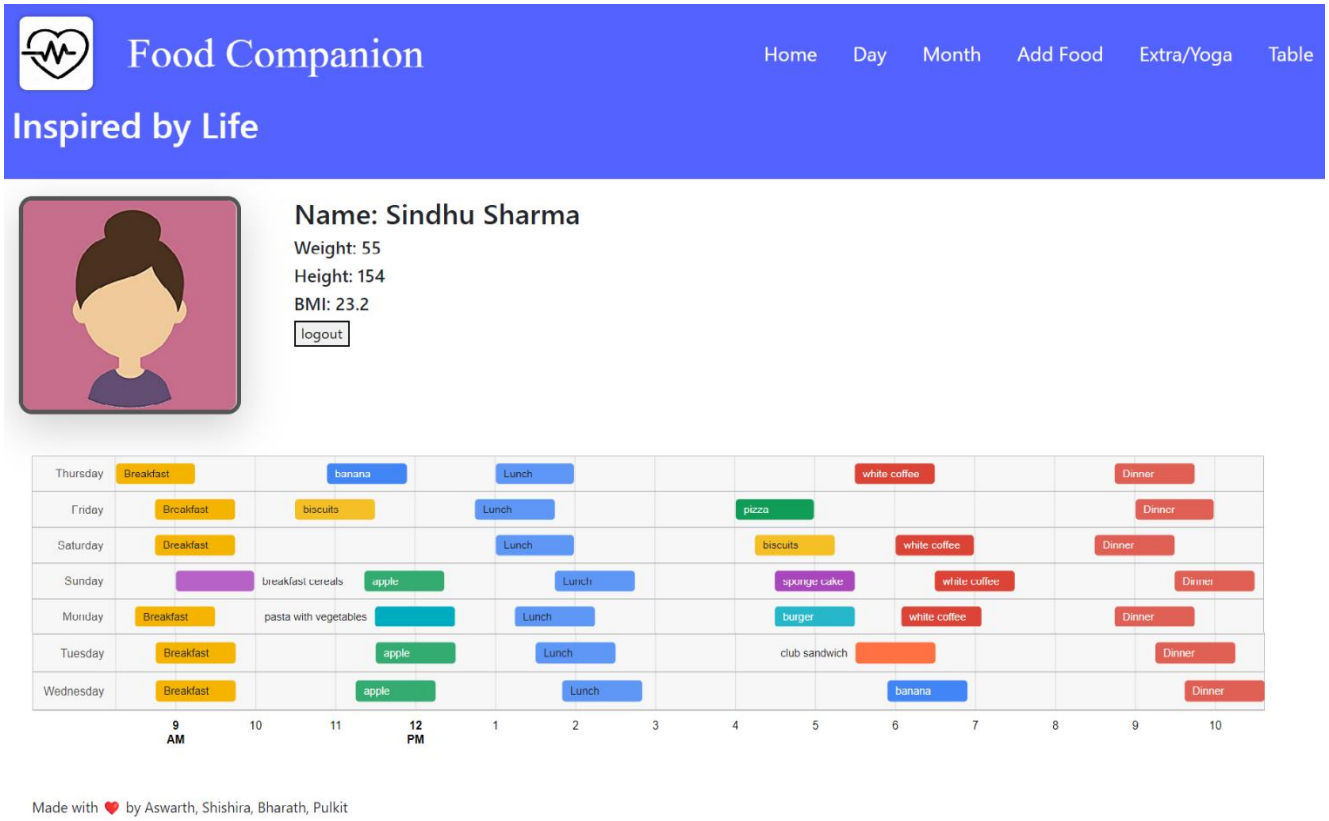

Fig. 3: Weekly usage chart

Figure 3 represents the dashboard of the website. Dashboard has all the general details of the customer. There is also a timeline chart, which logs foods eaten on the weekly basis.

The figure 4 represents the in-detail nutritional chart.

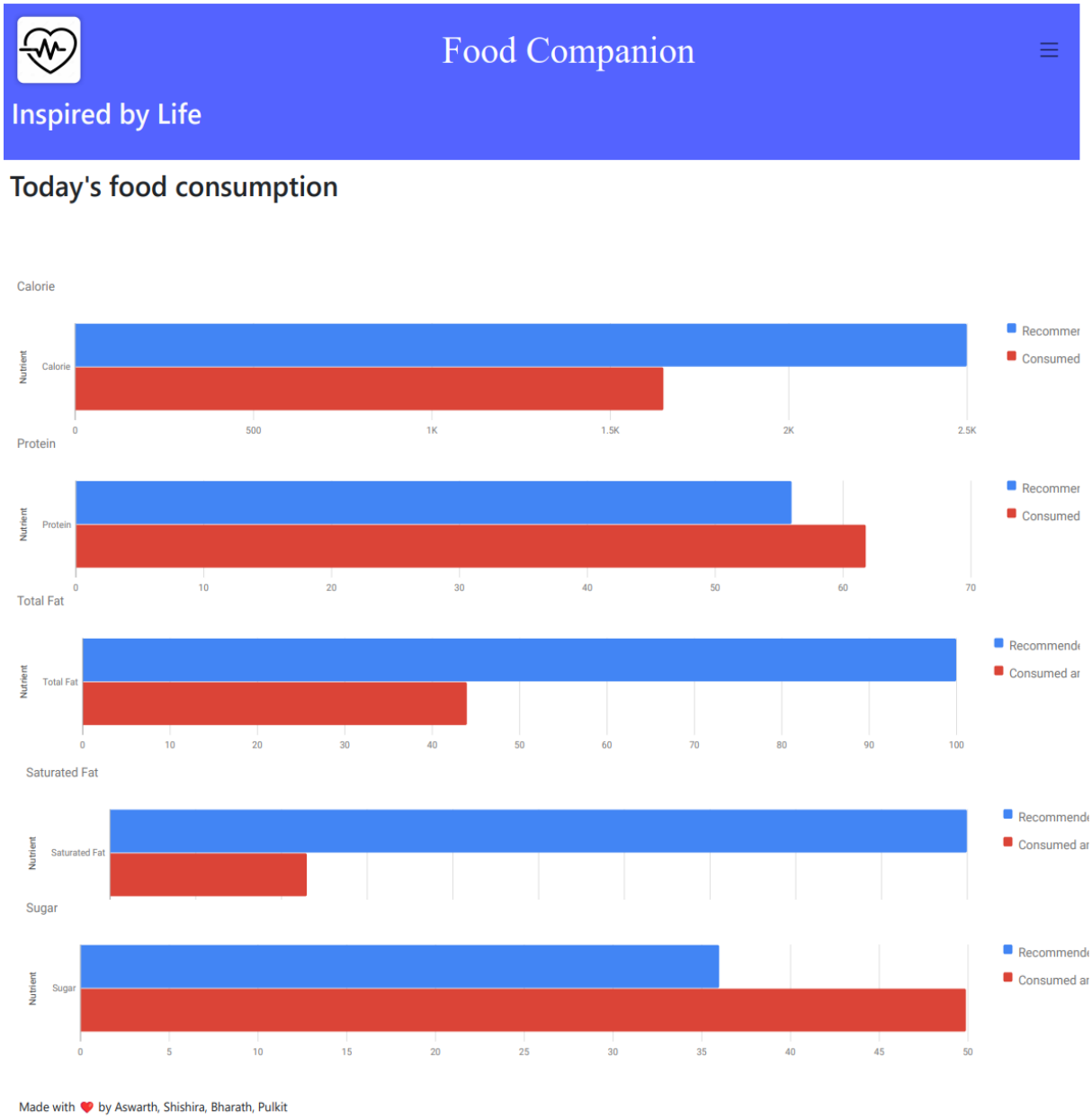

Fig. 4: Daily usage chart

Figure 4, represents the detail chart of the nutritional value of the current day. It shows the recommended limit and the amount consumed. Based on the recommendation the user can plan what to eat for the rest of the day.

The figure 5 shows the nutritional value for the day in a table format

Food Name	Calories	Protein	Total Fat	Saturated Fat	Sugar	Time
water	94.5	7.9	2.3	1.5	10.6	13-12
apple	94.6	0.5	0.3	0.1	18.9	13-13
pizza	701.9	22.3	21.7	5.9	5.0	13-14

Fig. 5: Daily usage table

Fig no 5, represents the detail nutritional value for the day in the form if a table along with the time at which food was eaten

- Exercising: Apart from eating less and eating healthy, exercise and workout is also very important. Some people like gymming, some may like running or cycling, or some may even prefer yoga or workout's at home. Based on the preferences of the user, the website recommends the best workout plan for the users. Smartwatches if any, is used by the user can be integrated with the website which extracts all the necessary data from it on daily basis. The data includes: Steps, heart-rate, sleep data, Calories burnt, etc.

The figure 6 shows the recommends workout of the recommendation page.

Fig. 6: Fitness Recommendation

- Managing Workload of hospitals: The long lines and waiting periods at hospitals for tests, reports, consultation are increasing, year after year. This causes chaos at hospitals and clinics.The website allows the users to schedule appointments, according to the slots available at thehospitals using Appointment scheduler System by selecting the name of the doctor, so that they can go to the hospital/clinic at that time. Hence reducing workload on doctors, and they can even focus on each patient in more detail. This chaos also results in patients losing their reports and prescriptions. Firebase Storage has been integrated where users can store all the records at one place. This makes it easier for the doctors as well to access all the previous medical records of the patients in one click. A One-time QR-Code is given to the users once the user books an appointment. Scanning this QR-Code doctors can access the patients medical records only one, hence providing security to users

medical records.

The figure 7 shows the interface to schedule Appointments and the QR-Code generated.

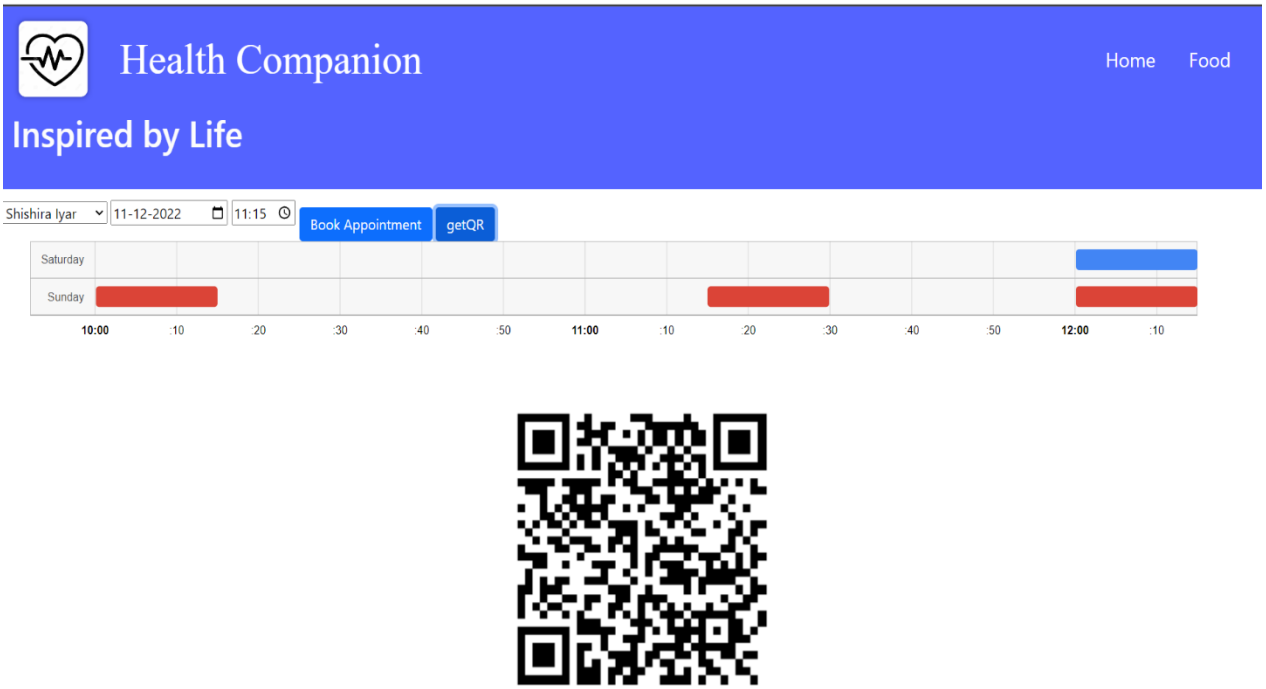

Fig. 7 Appointment Scheduling

Figure 7 shows the appointment scheduling interface where users can select the name of the doctor using a dropdown menu. Once the name is selected a timeline chart is displayed to the user, which shows the available timeslots to book appointments. The user can book an appointment with the doctor according to his convivence. The QR-Code is used the medical records of the patients. This is one time QR-code, which once scanned cannot be used again.

- Tablet Remainder System: It is often the case that people forget to take their tablets on time. This system remainds the users to take tablets when it is time to take it. Each tablet will be placed in a different box, with a LED placed under the box. The user initially needs to enter the time at which the tablet needs to be taken. When it is time to take the tablet, the LED glows and buzzer is used to alarm the user. Capacitive touch switch is placed inside the box, when the users puts his hand inside the box to remove the tablet, the LED and buzzer turn off. Thereby helping customers to take their medication on time.

The figure 8 represents the tablet remainder system interface and hardware model for the same.

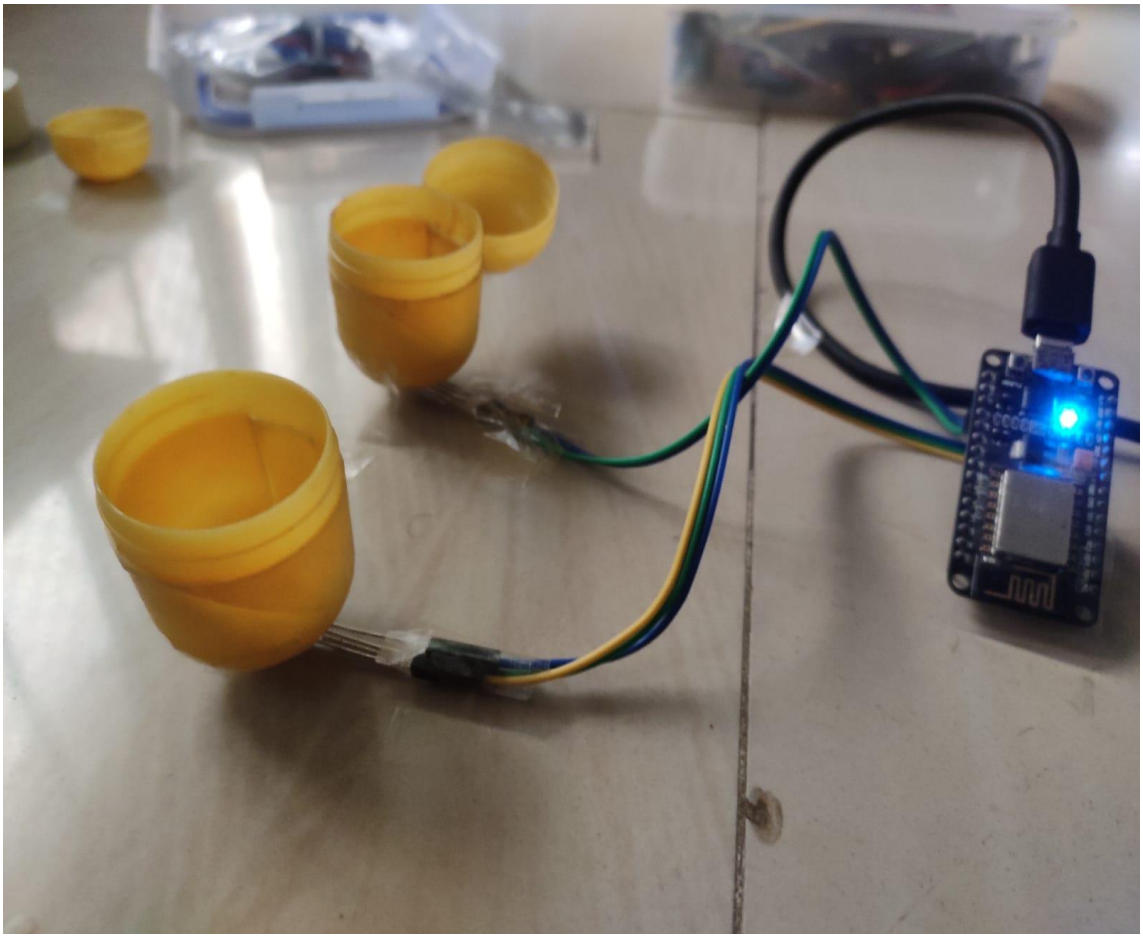

Fig. 8 Hardware Model of Tablet Remainder system

Figure 8 shows the hardware model used for tablet remainder system. An ESP8266 microcontroller is used along with cups with have a LED underneath them. A buzzer is used to provide an audio alert.

Fig. 9 Interface to schedule tablets

Figure 9 represents the interface which is used to schedule tablets. Tablet box is mentioned along with an input element which is used to enter the time at which the tablet is supposed to be taken. The data is stored in Firebase Realtime Database which is integrated with the Hardware model.

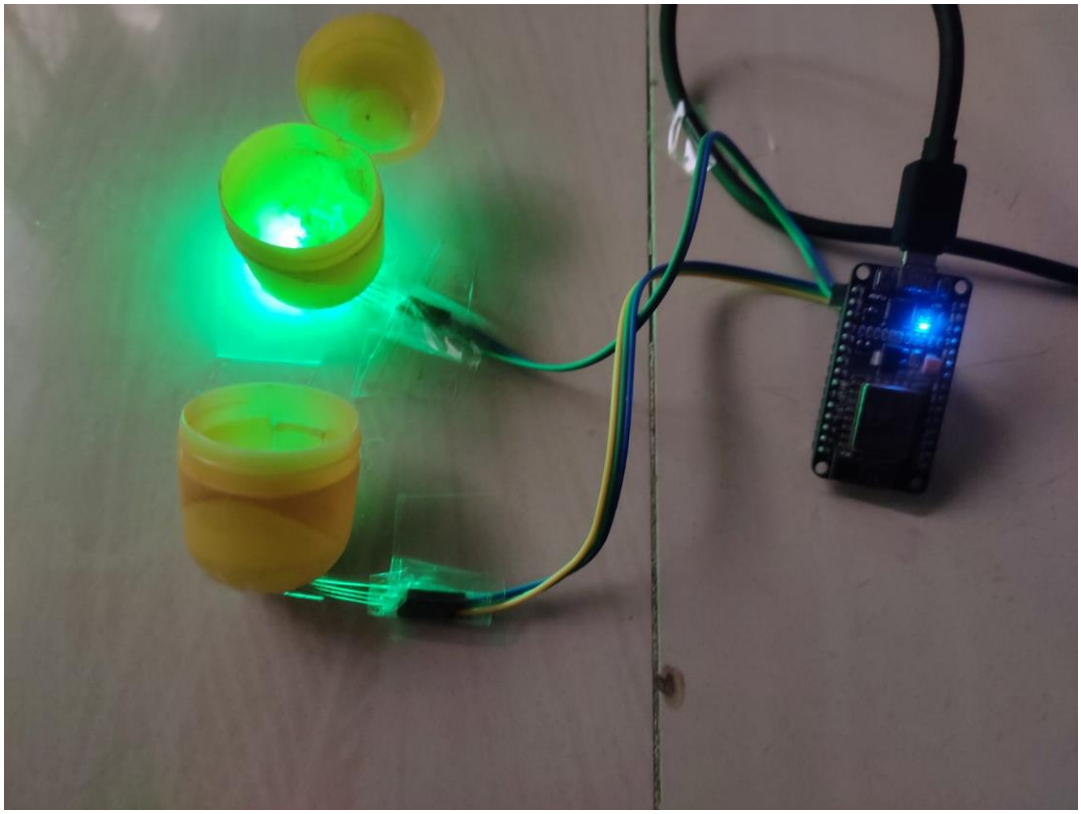

Fig. 10 Working of hardware model

Figure 10 shows the working condition of the hardware model.

- Motivation: There are many apps where users can track their daily workout schedule but they tend to lose motivation in just a few days. To prevent this from happening, gamification has been inducted into the project, where coupons, cheat days are provided to the users, if they stick to their diet and workout plans for atleast 1 month. Friends and family members can connect together to form a group, so there is a in-built competition among each other, and rewards are provided for the top performer of the month, thereby encouraging users to work harder.

V. Authentication and Security

Authentication and security in websites are very essential, especially in web-based applications. The website uses Auth0 for authentication to log in users and doctors. Auth0 is an API provider that provides a secure method to login using Google login. Google OAuth is in-built into Auth0. The users can either login through Google or create their own username and password credentials to login.

Authentication is very essential because customers use the website to store confidential information. These may include medical records, prescriptions, etc. No user would like to see his data leaked into the public space. Because of this reason, when a customer schedules an appointment with the doctor, a one-time QR-Code is generated. This prevents the access of these records to the doctor after the consultation is completed.

The figure 11 below represents the login screen and Auth0 screen.

Fig. 11 Login Screen for customers and Doctors.

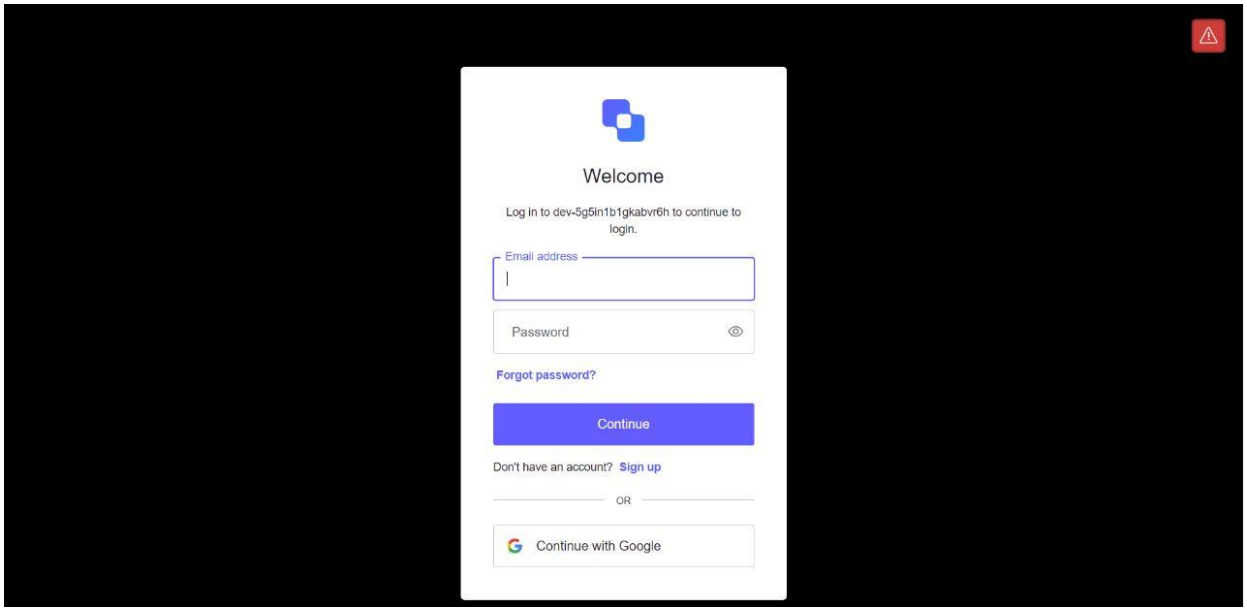

Fig 12. Auth0 interface used for login

VI. Conclusion:

In this work, a Web-Based health monitoring system is proposed and implemented. The proposed health monitoring systems have shown great success compared to traditional health monitoring systems which are limited to delayed service which also lack in providing medication, exercise, nutrient information to registered users. The daily and weekly nutrient intake information makes the user more conscious about food consumption and encourages them to maintain a healthy lifestyle. Integration of exercise recommendations along with scheduling of doctors/dieticians appointments for the user reduces the workload of the users. The unique feature of the developed application allows the user to store their medical records securely by providing a QR code/user. With this only the doctor under whom the user was registered only gets the authority to access the medical records of the particular user. The tablet recommendation system is one of a kind which is extremely useful for old-aged people who live alone at home to ensure that they take their tablets on time. This healthcare application helps society to reduce health issues.

VII. Future scope

The Proposed work Web-based health care system to assist the user to keep track of their nutrient consumption, recommendations for proper exercise and websites to get knowledge about the nutrient products. The future scope of the project is to implement a mobile application to provide new features such as communication establishment of the app with a user smartwatch. Enhancement of the application to support the users from different locations.

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Estimated benefits to the society and generation of income

In this work, a Web-Based nutrient-tracking application is proposed and developed.

Benefits of proposed work

1. The application provides details of daily consumed nutrients based on the food taken.
2. Based on calculated monthly nutrient intake and comparison with specified threshold application provides a diet recommendation
3. Provides exercise recommendations.
4. Also recommends suitable websites for the same exercise and diet tips.
5. Helps in the doctor's appointment schedule

Patients E-record maintenance

Measurable indicators of the project:

Sl.No	Indicator
1	Increase in the number of people to know the benefits of having nutrient food.
2	Reduction in mortality rate due to improper nutrient food
3	Helps the healthcare community
4	Helps people to schedule the doctor's appointment
5	Suggest that people select proper exercises to maintain their health
6	Medical E-record maintenance