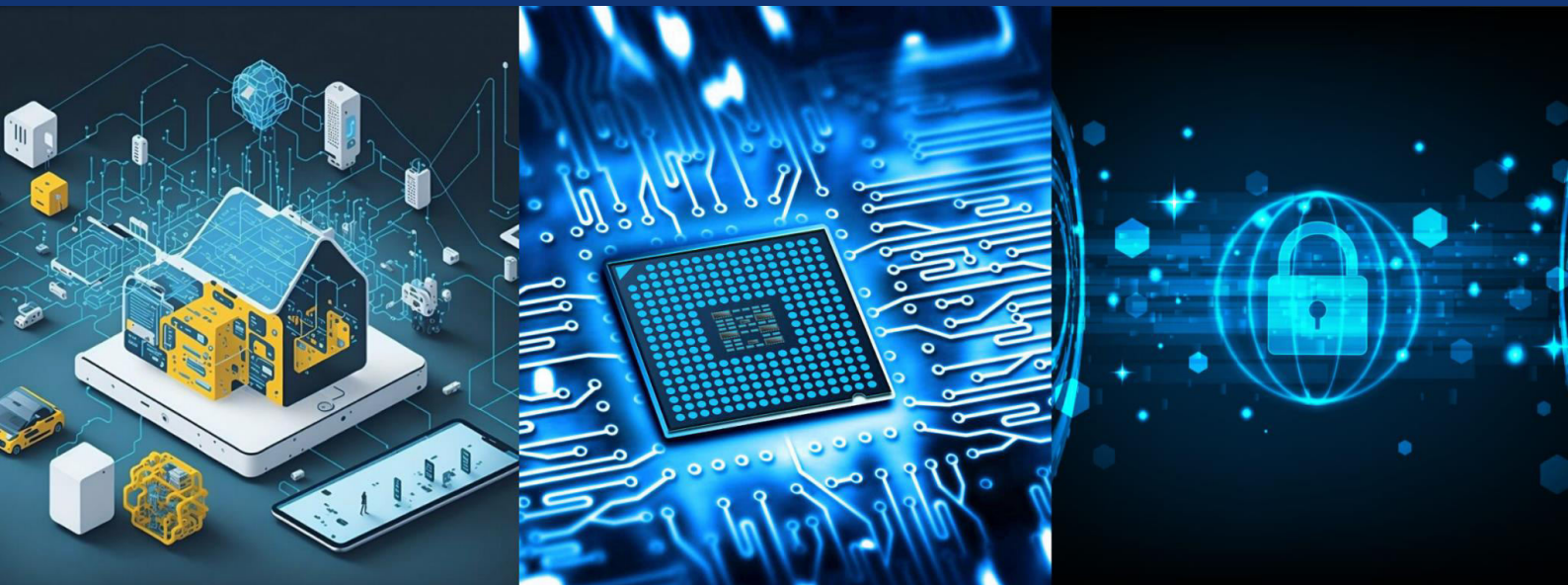
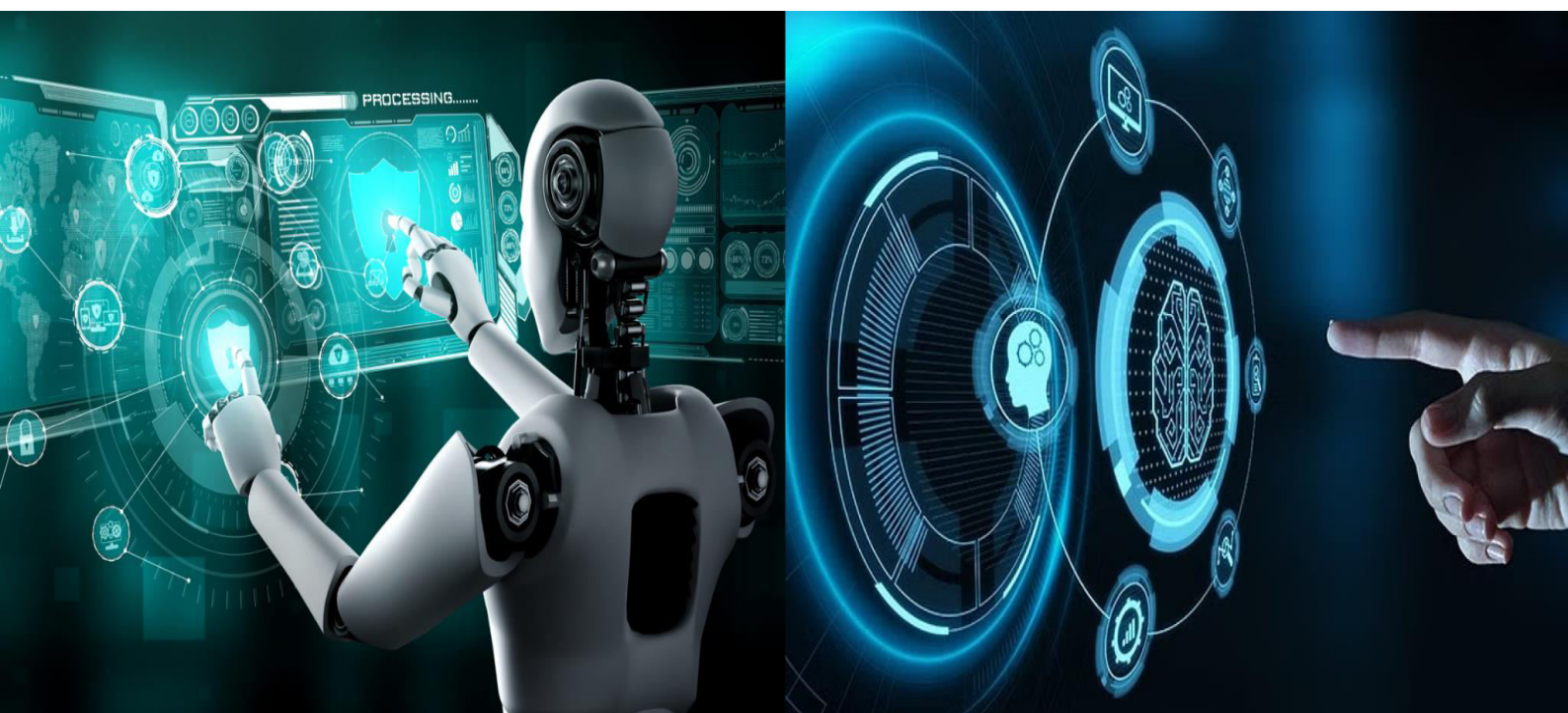




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Mobile-based Health Monitoring: Improving Wellness through Calorie, Hydration and Health Condition

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ABSTRACT: “Health: The Foundation of a Vibrant Life”. Health is a fundamental element that supports a lively and energetic existence. This research paper discusses the development of Healio, an application intended to help users manage their nutrition and health. The application provides personalized recommendations about the consumption of nutrients based on health conditions, guiding users to make good eating habits. Important features that have been addressed includes reminders about water intake, daily nutrient consumption, and calorie and body mass index calculations. Healio intends to create an awareness level about the dietary practices that is maximally improved through the process of observing the nutrient intake of users systematically and eventually ensuring better health results. Altogether, this set of functionalities opens up the way of Healio as a complete tool for health management and dietary support.

KEYWORDS: Health Management, Health, Body Mass Index, and Nutrients

I. INTRODUCTION

It is proven that promoting healthy lifestyles can have positive effects mainly on physical and mental health. It is so important for good health that regular exercise, good nutrition and sufficient sleep not be overlooked. Caloric diet is linked to a decrease in the risk of obesity and all consequences of obesity. Adequate sleep supports normal cognitive function, emotional processing, and immune system function. Also, it has been shown that proper nutrition is beneficial for mental health, since some nutrients can regulate (and functionally contribute to) mood [5][19]. Adequate water consumption is as well vital, because it takes part in digestion, thermoregulation and a good skin. Hydration, in turn supports the proper functioning of kidneys and the elimination of waste in the body [3]. The introduction of useful nutritional foods and sufficient water consumption allows you to establish the optimal body structure with respect to physical and cognitive health, which will then ensure long-lived health and vitality plus power [17].

Body mass is also a term for weight and is expressed in kilograms or pounds. It is a key indicator in health research and used in conjunction with body mass index to determine if the weight of an individual is within a healthy range [10]. Among the world population, increasing body mass and obesity have evoked increasing public health concerns more and more. Obesity affected over 1.9 billion adults in 2016 and over 650 million adults were obese as the WHO reports. Not surprisingly, it has quintupled within the past decades (up from its 1975 level of three times its rates) to a level that has almost doubled the number of serious health problems. Overweight/obesity is associated with increased risk of cardiovascular diseases, type 2 diabetes, musculoskeletal and some other cancers. According to WHO, about 2.8 million deaths each year are attributed to being overweight and obese [20]. An estimated 39 million children aged less than 5 years were overweight or obese in 2020. Body mass trend monitoring is essential for shaping and mitigating these increasing threats to health and for the delivery of effective public health interventions.

Water is the most important bodily fluid that accounts for about 60 percent of a person's body weight. Even a percentage level of its absence causes problems in digestion, proper skin appearance, and exercise performance.



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Dehydration caused by lesser amounts of water has been found to degrade performance and is associated with dietary habits, age, climate, medical conditions, metabolism, and activity levels. Dehydration is a very common problem in the elderly. It carries serious health complications and increased mortality rates, with patients hospitalized for dehydration at risk of dying within 30 days with a 17% risk and after one year with a 48% risk [2]. For patients with chronic conditions like kidney stones, fluid intake needs to be controlled to prevent stone development. In adults, it should yield at least 2.5 litres of urine per day. Water tracking helps ensure proper hydration and should, therefore, be practiced regularly as part of a daily routine to reap its full health benefits.

The inclusion of technology has dramatically altered the process of tracking and handling health by individuals. Real-time tracking of heart rate, blood pressure, and physical activity can be done with wearable devices, mobile health applications, and remote monitoring systems[8]. It lets people trace their vital health metrics: from water and food intake, heart rate to exercise. Health monitoring via technology has empowered people with better understanding and regular interventions in their lives towards healthier living. The importance of the mobile application is increasing with each passing day and it is mandatory to manage all the internet health data. Internet access is available for everybody these days and the mobile application is user-friendly[14].

II. LITERATURE REVIEW

Health monitoring apps incorporate various methods to monitor the health and are comprised of functions that aid in user tracking and improvement of general well-being. Such include step and activity tracking, contemplation of steps, distance covered, calories burned, and heart-rate monitoring for detection of arrhythmias like bradycardia or tachycardia. Many apps use sleep tracking to watch over sleep pattern and quality analysis and calorie tracking via diet logs supporting nutritional goals. Water intake is monitored and reminders set up for drinking sufficient water, while medication reminders assist users in managing their prescriptions in an organized way. Other functions include blood pressure and blood sugar monitoring to help users track vital health disease indicators such as osteoporosis and other diseases such as hypertension and diabetes. Mental health tracking is incorporated into moods and stress levels, with accompanying relaxation techniques, including meditation and breathing techniques [19]. Some applications link to third-party devices and platforms (e.g., smartwatches, Google Fit) and provide solutions that integrate all current health information. Also, several apps provide BMI and body composition analysis to enlighten users about their fitness condition [14]. Lastly, users are blessed with customizable goals and visual reporting of progress; hence, these health apps appear to be multifaceted in the promotion of both physical and mental health.

Health-monitoring applications are widely investigated and developed with a technology-powered agenda for the benefit of healthcare delivery and personal wellness. The incorporation of smartwatches and other wearables has boosted real-time monitoring of heart rates, steps, and physical activity [8]. Applications for the management of chronic diseases, such as diabetes and hypertension, equip users with blood sugar monitors and blood pressure tracking [15]. Analytics driven by AI provide tailored insights, especially in mental health apps and in those providing therapeutic routines and stress management strategies [1][7]. Sleep monitoring and eating monitoring apps produce improved sleep quality and eating quality, triggered remote patient monitoring efforts critical in continuous care for telemedicine. Studies underline the value of gamification techniques to improve user engagement in apps such as the Fitbit, which establish challenges and rewards to motivate the users. Specialized applications for the elderly or disabled users implement features to ensure accessibility such as voice commands and emergency alerts [8]. Research on data privacy and security stresses the desideratum of data encryption and compliance with privacy laws like FDA and HIPAA. Such platforms as Apple Health and Google Fit assure that all-encompassing data aggregation and interoperability, which only reinforces the significance of aggregated health data from different devices and sources aiming at users having an all-around view of the health metrics. It is a demonstration of the various applicability and rising impact of health monitoring applications on contemporary healthcare.

Despite some remarkable advancements, health monitoring apps have many gaps that hinder their effectiveness and uptake within the framework of best practice. Some struggle to provide accuracy and reliability mainly because they depend on inconsistent wearable data or manual input; their personalization features often do not address all diverse needs, such as rare conditions or cultural preferences. Data privacy and security issues remain a major concern: users do not trust apps because apps do not adhere sufficiently to regulations like HIPAA and GDPR. Interoperability means that data from multiple devices or several healthcare systems cannot be easily joined together, whereas accessibility



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features are often lacking, leaving many apps unsuitable for older users or those living with disabilities. However, even real-time monitoring and alerts are usually insufficient to detect critical health events, plus many apps suffer from poor engagement and retention for not sustained user interest. Since many of them depend on Internet connection, they cannot be effective in underdeveloped areas where Internet access is limited; and often they run exclusively out of formal healthcare systems, providing little use either for doctors or patients. Also, many apps emphasize physical health and negates the mental health aspect, thus neglecting holistic well-being [17]. Addressing these gaps will improve the usability, trust, and impact of health monitoring apps.

III. METHODOLOGY

Health Surveillance has a key role to continue an overall state of well-being, sickness prevention, and control of disease in a decent fashion. Healio was developed as a comprehensive health monitoring solution to empower users in managing their health proactively. The application consists of some general functions such as BMI estimation, caloric intake logging, fluid intake logging and also offers personalized health advices based on the user's input and the status of the user's health. Android Studio and Java, the application has an intuitive interface and has boxes to collect personal information, dynamic food choices and health status. It uses algorithms to analyse user data to compute the odds of nutrient deficiency and to deliver targeted health information by applying a JSON schema for a food dataset. In addition, this application has a notification system, which will remind the user to take his/her drugs at the right time and check periodically if the user should drink and stay healthy by the notification system of the Android application and Work Manager. Rigorous testing confirmed accuracy, reliability, and ease of use which made Healio a powerful tool in the pursuit of healthier lifestyle.

1. BMI Calculation and Health Assessment

Body Mass Index (BMI) is one of the most frequently used methods to estimate the body weight according to height and can be employed to assess if an individual is underweight, normal weight, overweight or obese. That is, this measurement distinguishes itself in the field of health monitoring by referencing the risk that a disease holds to take place, for instance, for some cardiovascular disease, diabetes, or for another lifestyle disorder.

$$BMI = \frac{\text{Weight}}{(\text{Height})^2}$$

In Healio, the BMI calculation tool lets the user enter the height and weight units, and the software calculates the BMI in real time. At that point the app groups the output in several categories—underweight, lean/normal weight, overweight and obese—and returns feedback to the user about his/her health. This allows users to monitor their weight and to take an informed approach to diet and exercise. The application also provides health tips (as a function of the obtained BMI), suggesting the appropriate lifestyle choices for an individual's situation.

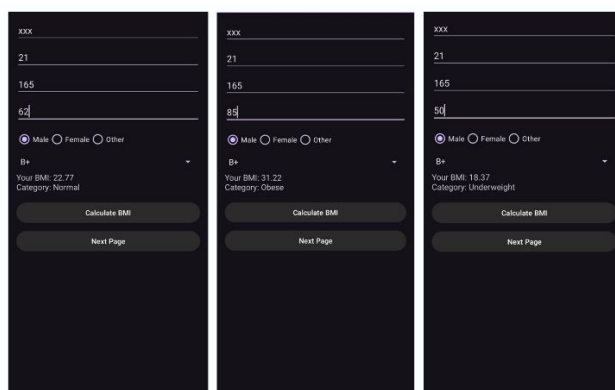


Fig 3.1



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2. Calorie Tracking and Nutritional Management

Calorie tracking plays a key role in controlling a diet, weight loss or in the management of individual medical conditions. Monitoring the number of calories consumed daily can help users understand their nutritional intake, avoid overeating, and maintain a healthy body weight.

For Men:

$$\text{BMR} = (10 \times \text{weight}) + (6.25 \times \text{height}) - (5 \times \text{age}) + 5$$

For Women:

$$\text{BMR} = (10 \times \text{weight}) + (6.25 \times \text{height}) - (5 \times \text{age}) - 161$$

In Healio, users can input food items dynamically and receive immediate feedback on the caloric content of their meals. The app leverages an extensive JSON-enabled food dataset which includes rich nutritional data, such as calories, fats, proteins and carbohydrates. This enables the app to give the user an individualized daily caloric intake summary, that ensures the user limits his/her nutrition towards healthy limits depending of activity level and health goal. The application app further monitors the total calories consumed overtime and allows users to follow their progression while also suggesting modifications in their diet.

3. Notification System for Health Reminders

Health-oriented reminders are an essential part of helping someone to adhere to health goals, particularly when one is managing highly complex health plans (e.g., monitoring hydration, adhering to drug regimen, or monitoring condition specific health alerts). Early notification can very effectively lead to increased compliance and better health results.

In Healio, the alert system is embedded to deliver timely (i.e., as scheduled) reminders for several health features:

Hydration Alerts: Using the app, periodic reminders are sent to the user to take a drink of water encouraging the user to be hydrated all day long. These cues can be configured according to the needs of the user and the daily consumption of fluids.

Medicine Notifications: Users can configure it so that alerts for prescribed medication intake are triggered. The application guarantees that the patient gets timely reminders to take his/her drugs based on his/her doctor's orders, which contributes to improving medication adherence.

Health Condition Alerts: According to the health condition of the user (i.e., diabetes, hypertension, or obesity), the app gives personalized notifications including health advice, food suggestion or lifestyle modification related to the specific condition. For instance, a diabetic user may be provided with prompts for glucose monitoring and restriction of some foods.

IV. EXPERIMENTAL RESULTS

1. Monitoring BMI Progress

Healio can compute BMI and BMI trends for a certain user and categorize such users as underweight, normal weight, or overweight, respectively [10]. A visual update on the timeline further encourages users to stick to such a program on a day-to-day basis.

2. Tracking Nutritional Intake

This application enables users to track their diet by analysing macro-and micronutrients with total quality nutrition. Personalized recommendations push users in the right direction to keep their nutrient intake balanced, fix any specific deficiencies or overabundance, and encourage healthier choices on a journey where the habit takes hold in time.



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3.Tailored Health Advice

Through a direct analysis of user-specific data, the app helps users gain personalized health recommendations or real-time tips for hydration and well-being. This dynamic approach generally accommodates users in managing diabetes, hypertension, or even obesity.

4.Hydration Reminders

The app sends an hourly alert that can be customized according to the user's needs in order to provide hydration for the user. This feature supports energy, hydration, skin health, and overall wellness and therefore contributes to meeting the daily hydrating requirements during even the busiest of days.

5.Personalized Reminders

It keeps customizable reminders for hydration, medicines to be taken, and other health-related duties. These reminders help users remain adherent to health regimens, monitoring chronic illness, and nurturing healthy habits.

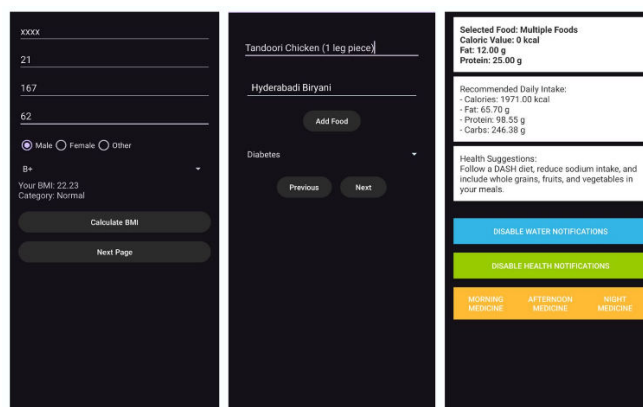


Fig 4.1

V. CONCLUSION

The state of health has become a launchpad for self-regulation in which Healio through an app is a milestone. Healio gives assistance to users all along-their way toward healthy living with a balanced diet through technology. The device permits one with the means to observe an interesting aspect of preventive measures for diseases-some amount of dietary problems that one's condition symbolizes-and how they can best be improved in faster and more controllable ways than biomedicine.

One of the unique features of the application is the water reminders. The Help program that the user can monitor once in a day allows for data revision by finding out the average number of calories and alterations of both body mass index and weight. Therefore, the app promotes the cultivation of healthy habits in the users and the adoption of a healthy lifestyle. It, therefore, justifies this whole adoption due to the lifestyle they presently live, causing them obesity to occur as a result of their food intakes.

Apart from the above-mentioned reasons, technology incorporation comes first in the race since it has been and is still the main player in the machine of health management. Healio is of tremendous help to us in cultivating proactivity in health. Apart from easing the process of checking multiple health parameters, it teaches the patient how to incorporate various measures into his or her daily activities that would help achieve the set goals whilst still being active during the recuperation period.

So, Healio's practical application provides a good example of how modern technology can support healthy living and, thus, a good tool for anyone wanting to change their life for better and feel and look healthier in mind or body. At a



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time when it comes to increasing public health challenges, apps like Healio are the platforms in educating the youth and working on the strategies which will indeed be efficient, resulting in much more healthy societies.

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