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PERSONALIZED EXERCISE PLANS WITH IOT

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Abstract: The Personalized Exercise Plans with IoT project combines computer vision, IoT, and machine learning to create a smart, interactive exercise assistant. Using Python libraries like MediaPipe and OpenCV, the system detects, tracks, and counts user exercises, such as sit-ups and push-ups. The exercise data is sent to an Arduino Uno, which uses an LCD and RGB LEDs to provide real-time feedback, encouragement, and limit alerts. Push buttons allow users to select specific exercises, ensuring personalized engagement and fitness tracking.

1. INTRODUCTION

Maintaining a consistent exercise routine is essential for physical health, yet many individuals lack motivation or struggle to track their progress accurately. This project leverages IoT and AI to provide users with real-time feedback, exercise tracking, and motivational prompts, fostering a more engaging and interactive workout experience. The solution aims to cater to individual fitness goals by enabling users to select and monitor specific exercises

In recent times, the human population has been facing numerous health issues, in-clouding fitness problems, improper eating habits, mental health disorders, and more. Maintaining a healthy diet not only makes us feel good but also provides us with increased energy, improved overall health and well-being, and a boost in mood. Both physical and mental fitness are crucial aspects of a fulfilling life. By adopting a balanced diet and incorporating regular exercise into our routines, we can enhance our health and fitness levels.

The personalized health monitoring framework, coupled with a diet and fitness recommendation system, offers a novel solution to modern healthcare by integrating technology with individualized health tracking and management. Its primary goal is to provide users with a streamlined and

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Vol 13, Issue 1, 2025

effective approach to monitoring their dietary and fitness habits while also offering personalized recommendations and guidance to help them achieve their health goals [1]. Given the rising prevalence of chronic diseases and lifestyle-related health concerns, a personalized health monitoring framework empowers individuals to take control of their health and improve their overall well-being. The authors in ref. [2] made use of recent technological advancements to facilitate the transformation of traditional healthcare systems into smart healthcare systems. They leveraged wearable devices and connectivity to enhance healthcare management through improved efficiency, convenience, and personalization. The main objective of the IoT-based Framework for Personalized Health Assessment and Recommendations using Machine Learning is to leverage IoT technology to create framework that can assess an individual's health status and provide personalized recommendations. This framework aims to utilize machine learning algorithms to analyze data collected from various IoT devices, such as wearable sensors and health monitor-ing devices [3]. By analyzing this data, the framework can assess an individual's health condition and generate personalized recommendations for improving their well-being [4].The ultimate goal is to enable personalized healthcare interventions based on real-time monitoring and analysis of IoT-generated data. The IoT-based framework for personalized health assessment and recommendations utilizes machine learning algorithms to analyze data from IoT devices and provide per-signalized health recommendations. The framework collects data from wearable sensors and health monitoring devices, applying machine learning techniques to extract relevant features and identify patterns or anomalies. Based on this analysis, the framework assesses an individual's health status, detects potential risks, and evaluates overall well-being [5].Using machine learning, personalized recommendations are generated by considering the health assessment results, medical history, lifestyle, and preferences [6].

2. LITERATURE SURVEY

To promote a healthy lifestyle, it is essential for individuals to maintain a well-balanced diet and engage in customized workouts tailored to their specific body conditions and health concerns. In this study, we present a framework that assesses an individual's existing health conditions, enabling people to evaluate their well-being conveniently without the need for a doctor's consultation.

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Vol 13, Issue 1, 2025

The framework includes a kit that measures various health indicators, such as body temperature, pulsate, and blood oxygen level, and body mass index (BMI), requiring minimal effort from nurses. To analyze the health parameters, we collected data from a diverse group of individuals aged 17–24, including both men and women. The dataset consists of pulse rate (BPM), blood oxygen level (SpO2), BMI, and body temperature, obtained through an integrated Internet of Things (IoT) unit. Prior to analysis, the data was augmented and balanced using machine learning algorithms. Our framework employs a two-stage classifier system to recommend a balanced diet and exercise based on the analyzed data. In this work, machine learning models are utilized to analyze specifically designed datasets for adult healthcare frameworks. Various techniques, including Random Forest, CatBoostclassifier, Logistic Regression, and MLP classifier, are employed for this analysis. The algorithm demonstrates its highest accuracy when the training and testing datasets are divided in a 70:30 ratio, resulting in an average accuracy rate of approximately 99% for the mentioned algorithms. Through experimental analysis, we discovered that the CatBoost algorithm outperforms other approaches interms of achieving maximum prediction accuracy. Additionally, we have developed an interactivewebplatform that facilitates easy interaction with the implemented framework, enhancing the use experience and accessibility.

With the global economic growth, fitness club is developing rapidly in the world. Meanwhile, the fitness industry is booming especially for urban white-collar population. In the circumstances, people need more scientific and practical guidance to build their body. In this paper, we design an Internet of things (IoT) based fitness system to monitor the health statuses of exercisers. The system provides guidance for exercisers. When exercising, the exercise data is collected by sensors and fitness band. Subsequently, these data are sent to the system to be analyzed. With the help of artificial intelligence technology, the system can extract useful guidance information for users' body building. In this paper, we will describe the details of the system and further reach out to the implementation technologies. The design of this kind of system is a trend for the future fitness application.

Pervasive computing has the potential to completely change how we manage people's health and well-being. The seamless

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Vol 13, Issue 1, 2025

collection of real-time data on a range of health parameters, such as physical activity, eating habits, and sleep patterns, is made possible by the seamless integration of sensors and actuators into our everyday environment. The novel Internet of Things (IoT)-connected health and wellness coaching platform proposed in this study uses ubiquitous computing to provide users with personalized feedback and assistance. A variety of IoT devices, including smart scales, wearable fitness trackers, and sleep monitors, will have their data aggregated by our imagined platform. The software will create unique wellness and exercise programs for every user by utilizing this varied information. To help users reach their fitness and health goals, real-time feedback and support systems will be seamlessly integrated. In this article, we argue that there is significant potential for our suggested platform to advance the area of personal fitness and well-being. We want to leverage pervasive computing to increase user efficacy and engagement in achieving health and fitness objectives, while also improving the effectiveness of individualized feedback and assistance. 1 Introduction In the present period, personal wellness and fitness are becoming increasingly important aspects of modern lifestyles, marking an unparalleled paradigm change in society's consciousness. In light of this cultural shift, ubiquitous computing has become a revolutionary force that can completely change the way people interact with their health. Pervasive computing extends beyond the boundaries of technology to become an integral part of our everyday lives, providing real-time insights into the nuances of critical health metrics. This paper advocates for the creation and deployment of an Internet of Things-based health and wellness coaching platform, acting as a clear call to action for innovation. This revolutionary project is positioned at the nexus of state-of-the-art technology and the basic human need for well-being. By carefully combining data from a wide range of IoT devices, such as smart scales, wearable fitness trackers, and sleep monitors, the suggested platform hopes to go beyond the traditional limits of health care. Our platform envisions a paradigm where customized feedback and support take center stage in the complex web of health and wellbeing, where one-size-fits-all solutions fall short. Through the use of ubiquitous computing and its ability to provide personalized insights, we hope to enable people to take a proactive and knowledgeable approach to their health. The integration of data from various IoT devices

is the cornerstone of our journey, providing the groundwork for the development of customized fitness and wellness programs. Beyond just compiling data, the platform wants to be a dynamic orchestrator that can translate unprocessed data into meaningful insights that are tailored to the specific details of each person's health situation. The person who reads this will encounter pervasive computing, IoT integration and the creation of customized health narratives as they follow the outline of this article. Our group's goal is based on the conviction that this cutting-edge platform has the power to transform people's personal health journeys and make a significant contribution to the larger conversation about health and wellness in our technologically advanced society. As we dive into the details of this undertaking, the paper presents a narrative that

The "IOT Based Exercise Cycle" project combines a variety of technologies, including computer hardware and software, to provide bikers with a new modern home exercise solution that immerses them in their surroundings. As a result, a cyclist can monitor some of the most significant training data online via a web page, including speed, distance covered by the rider, heart rate, and oxygen level during exercise. Additionally, depending on the amount of peddling, a cyclist can view flashing pictures on a web page. This cycle is linked to the cyclist's heart rate and temperature, allowing him or her to keep track of their BPM (Heart Beats Per Minute) and body temperature. The system consists of both hardware and software components. Hardware is in charge of gathering, measuring, processing, and transmitting data from sensors. A server contains a Front-End Web page that displays and controls data for cyclists on the software side. Finally, there is a web page that displays all of the parameters that the rider can use to track his or her route.

3. EXISTING SYSTEM

The methodology employed in developing the Fitness Tracking System for Gym Administration Framework encompasses a multifaceted approach integrating technological tools, data analytics, user feedback, and iterative development cycles. The initial phase involved comprehensive market research and needs assessment to identify key pain points and requirements within the fitness management domain. This process included surveys, interviews, and focus groups with gym owners, trainers, and members to gather insights into their challenges, preferences, and expectations.

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Based on the research findings, a conceptual framework was outlined, delineating the core functionalities, data integration points, user interfaces, and system architecture. The development process followed agile methodologies, with iterative cycles of prototyping, testing, and refinement. Cross-functional teams comprising software engineers, data scientists, UX designers, and domain experts collaborated closely to ensure alignment with project goals and user expectations.

The technical architecture of the system was designed to be scalable, secure, and adaptable to diverse gym environments. Cloud-based infrastructure was leveraged to facilitate data storage, processing, and real-time analytics. Application programming interfaces (APIs) were utilized for seamless integration with wearable fitness devices, billing systems, and third-party services, ensuring interoperability and data synchronization

Traditional fitness tracking systems often rely on wearable devices, which may not provide detailed insights into exercise form and progress. There is a need for a non-invasive, interactive system that tracks exercises accurately, offers real-time feedback, and motivates users to achieve their fitness goals

4. PROPOSED SYSTEM

The system provides guidance for exercisers. When exercising, the exercise data is collected by sensors and fitness band. Subsequently, these data are sent to the system to be analyzed. With the help of artificial intelligence technology, the system can extract useful guidance information for users' body building. The proposed system of this project is shown in Fig 4.1.

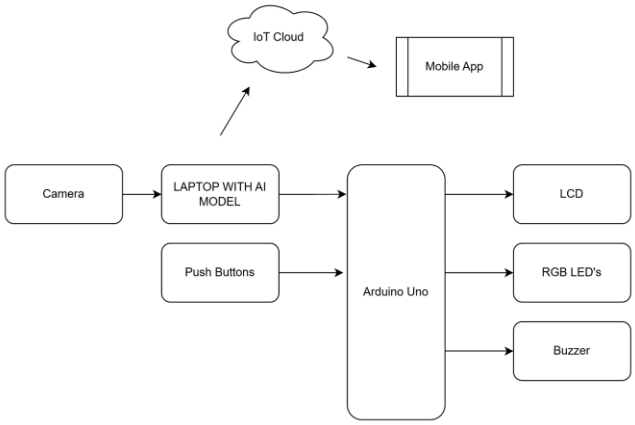

Fig 1 Block Diagram

Working Flow Steps

Exercise Detection and Counting:

Use MediaPipe and OpenCV to detect the user’s body movements.

Apply machine learning techniques to identify specific exercises and count repetitions.

Data Transmission:

Send exercise counts to an Arduino Uno through serial communication.

Interactive Feedback:

Display the exercise count on an LCD.

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Use RGB LEDs for real-time feedback:

Green: Encouragement during exercise.

Yellow: Approaching exercise limits.

Red: Limit reached or alerts triggered.

Exercise Selection:

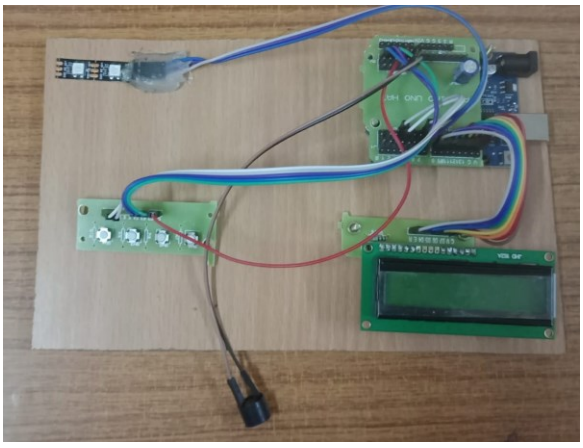
Provide push buttons for users to select exercises like sit-ups and push-ups.

Encouragement and Alerts:

Offer motivational prompts (e.g., "Keep going!" or "Great job!") based on performance.

Trigger alerts if the user exceeds predefined exercise limits or performs incorrect form

5. RESULTS



6. CONCLUSION

The system successfully detects and tracks exercises using MediaPipe and OpenCV, providing accurate repetition counts and personalized feedback. The integration with Arduino enables engaging, real-time interaction through LCD and RGB LEDs, enhancing user motivation and performance.

This project bridges the gap between technology and fitness by offering an innovative, interactive, and non-invasive solution for exercise tracking. By combining AI, IoT, and user-friendly hardware, it caters to a wide range of fitness enthusiasts, from beginners to professionals, ensuring a smarter and more effective workout experience.

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