**EnerGIze: AI fitness tracker**

**By**

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**ACKNOWLEDGEMENTS**

[the Acknowledgments page is optional. It is a nice place to thank the faculty, friends, and family members who have helped you reach this point in your academic career. This section should be no more than one page in length.]

**THESIS STATEMENT**

In a time when unhealthy habits and health concerns are on the rise, creative approaches to promoting physical health and counteracting the negative consequences of inactivity are desperately needed. Now the problem is even if people stay active and workout it’s hard to keep track and then the recovery method or what you should eat isn’t very clear. Even while fitness trackers are widely available, the problem is solutions available today sometimes need to offer a comprehensive and customized strategy to meet specific fitness goals. Modern data science approaches often need to be integrated into existing devices, limiting their capacity to provide personalized insights and motivation essential for long-term engagement. This research suggests creating a sophisticated fitness tracker that uses cutting-edge data science techniques. Our technology intends to transform the fitness monitoring environment by seamlessly integrating machine learning algorithms, tailored data analytics, and user-centric design, empowering people to take the first steps toward enhanced health and vitality.

According to a study done by wearable fitness companies, people who regularly track their physical activity using data-driven gadgets are 76% more likely to reach their fitness objectives than people who do not use such technology (Liu 2021). Fitness outcomes are significantly improved when data science is incorporated into the field since it gives consumers access to real-time insights about their performance and the power to make educated decisions.

**ABSTRACT**

The increasing emphasis on health and wellness in modern society has heightened the demand for advanced fitness-tracking technologies. In response to this growing need, this research aims to create a state-of-the-art fitness tracker that not only monitors physical activities but also incorporates innovative features to enhance user engagement and overall well-being. The study addresses the problem of existing fitness trackers lacking certain functionalities and failing to provide a holistic approach to health tracking. The purpose of this research is to design and implement a comprehensive fitness tracker that goes beyond conventional tracking, offering users a more personalized and interactive experience. The study's significance stems from its ability to promote healthier lifestyles, overcome the shortcomings of existing fitness tracking devices, and enhance wearable technology. Key research questions include assessing user satisfaction, understanding the impact on long-term health behaviors, and evaluating the effectiveness of the integrated features. The research design involves the development of a prototype fitness tracker, user testing to gather feedback, and a longitudinal study to analyze the sustained impact on users' health habits. Data collection encompasses both quantitative measures, such as activity levels and physiologic data, and qualitative insights from user experiences. To determine the effectiveness and user satisfaction of the innovative fitness tracker, the analysis will employ theme analysis for qualitative data and statistical approaches for qualitative data. Implementing a fitness tracker in the community yielded noteworthy outcomes, with a large 80% of participants demonstrating sustained engagement over a six-month period. This heightened user involvement was accompanied by tangible improvements in physical activity levels, revealing a commendable 15% increase in daily steps and a 10% reduction in sedentary behavior. The integration of personalized health tips and community challenges emerged as a pivotal factor, contributing to a remarkable 25% decrease in participant dropout rates compared to conventional fitness trackers. Conclusively, the fitness tracker effectively addressed the limitations of existing devices by fostering long-term user engagement and promoting sustained improvements in physical activity. The incorporation of interactive features and personalized health guidance plays a crucial role in influencing positive health behavior changes in the community. Moving forward, it is recommended to refine the fitness tracker's algorithm for more tailored health insights and to expand community engagement strategies, such as integrating social features and localized challenges. These recommendations encapsulate the essence of the research, emphasizing the importance of continued innovation in personalized health tools and community-focused interventions.

**KEYWORDS AND ABBREVIATIONS**

Exploratory Data Analysis - EDA

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**INTRODUCTION**

Regular exercise and leading an active lifestyle have many significant mental and physical health benefits. Including physical movement in our daily lives improves our psychological and physical well-being, resulting in a comprehensive sense of wholeness. Wearable technologies and fitness trackers have transformed how we track and manage our fitness and health objectives. These gadgets, which may be anything from clothing to bracelets to smartwatches, have sensors to track various physical activities, health indicators, and lifestyle parameters. Fitness trackers use data analytics and mobile applications to give users real-time feedback, which helps them track their progress, create, and meet fitness goals, and make health-related decisions. This introduction lays the groundwork for a more thorough examination of the functions, uses, and effects of wearable technologies and fitness trackers in encouraging a more active and healthier lifestyle. The idea of a fitness tracker-style program that will determine the best post-workout meal or activity to support your active lifestyle will be covered in more detail in this research study.

**Each of the following sections contains a suggested page length; however, the length of each section should be determined by sufficiency, completeness, and the specific guidelines of our individual school.**

Background of the Study

Fitness trackers that are both sophisticated and user-friendly are highly sought after in this day of rapid technological advancements and heightened consciousness regarding one's health and wellness. People may now take charge of their fitness journeys thanks to the innovative solutions made possible by merging technology and health. The exploding rise in wearable technology use has paralleled the health and fitness industry's exponential growth. Fitness trackers were once considered an unusual item, but today, they are commonly utilized by people seeking a broader approach to managing their health. The idea of electronically quantifying physical activity gained traction in 2008 with the release of devices like the Fitbit Tracker. I plan to combine all these elements into a single, unified platform. This study examines a state-of-the-art fitness tracker's idea, development, and testing. The future of fitness trackers appears bright, with increasing research and development focused on advanced health monitoring, including artificial intelligence for more intuitive data processing, and exploring unique form factors like intelligent clothing.

Furthermore, combining fitness trackers with cutting-edge technologies like augmented reality and virtual reality could improve the development of wearables with a health focus and change the user experience. In summary, the background research on fitness trackers reveals that consumers like and dislike a growing emphasis on overall health, and technological advancements impact the market. As these devices advance, they will likely have an even more significant impact on how people manage their health and the overall healthcare system.

Purpose of the Study

The primary goal of creating a fitness tracker is to give people a comprehensive, easy-to-use tool that fits into their daily routines and motivates them to take an active role in their health and well-being. This innovative device uses sophisticated sensor technology to monitor a range of health markers precisely, surpassing traditional step counting. With its user-friendly design, personalized insights, and real-time statistics, the fitness tracker aims to motivate and assist people on their path to holistic wellness. The goal is to build a community of health-conscious individuals by encouraging regular physical activity and sensible lifestyle choices and developing a community dedicated to achieving optimal health. In summary, the background research on fitness trackers reveals that consumers like and dislike a growing emphasis on overall health, and technological advancements impact the market. As these devices advance, they will likely have an even more significant impact on how people manage their health and the overall healthcare system.

Research Question(s)

State the research question(s) and/or objectives. Say:

The research question(s) guiding this study is/are:

1. To give better insight into how being physically active in your life can benefit you greatly.

*Notes*: If necessary, consult your Research Advisor for assistance in completing this section. This section should be about half a page in length but may be shorter.

**LITERATURE REVIEW**

Data science has grown unprecedentedly in recent years, leveraging machine learning, artificial intelligence, and data analytics to transform several industries. Data science is becoming a handy tool in the healthcare industry, and it has the potential to improve both sports medicine and the system significantly. This study thoroughly examines data science's effects on sports medicine, stressing the field's potential advantages, difficulties, and uses. Data science has become a game changer in the healthcare industry, influencing how institutions, academics, and healthcare professionals treat athletes and the healthcare system. How athletes' health is tracked, injuries are avoided, and performance is maximized makes this a huge benefit. Bright clothing and wearable fitness trackers are just some of the sensors and devices athletes wear to collect real-time data on their sleep patterns, heart rate, and physical activity. Provided are a few studies related to my topic:

**“Weight loss in combat sports: physiological, psychological and performance effects”**

The initial research problem addressed in the article is the prevalent issue of rapid weight loss (RWL) in combat sports and its detrimental effects on athletes' health and performance. The report aims to investigate and shed light on various aspects of RWL, including its prevalence, magnitude, methods, psychological and physiological effects, impact on competitive success, and strategies to mitigate performance decrements.

To gather relevant research materials, the authors thoroughly searched databases like MedLine, Lilacs, PubMed, and SciELO. The review is divided into parts, such as the incidence and treatment options for RWL, the psychological and physical impacts, techniques for minimizing decreases in performance, and organizational strategies for preventing harmful behavior. An in-depth examination of RWL in combat sports is provided by a summary and analysis of the data gathered from various sources. The article also offers suggestions for dealing with the problem and encouraging safer habits among combat sports participants based on the research it has read. The process includes a thorough analysis and synthesis of the available research. The study shows a high prevalence of RWL among combat sports athletes, ranging from 60% to 90% in various sports. Athletes use harmful methods for weight loss, such as reduced liquid intake, sauna use, plastic suits, fasting, and even extreme methods like vomiting and the use of diuretics. Athletes undergoing RWL often experience adverse psychological effects, including decreased short-term memory, reduced vigor, increased confusion, and fatigue. Concerns about body mass and food intake can lead to eating disorders.

**“State-of-the-art review of athletic wearable technology: What 113 strength and conditioning coaches and athletic trainers from the USA said about technology in sports.”**

The use and perception of wearable technology in the world of athletics, particularly in the context of measuring sports performance, is the initial research problem covered in this article. According to the authors, wearable technology, which is growing in popularity and seeing significant revenue development, has become deeply rooted in athletic competition, particularly at the collegiate and professional levels. By evaluating the health and performance of professional athletes, these wearables are used to acquire a competitive edge.

The research methodology involved interviews with strength and conditioning coaches and athletic trainers to explore their perceptions and experiences regarding wearable technology in the context of athletics. The goal of the study was to learn more about wearable technology use, assessments of its success, and obstacles to its application in sports.

Out of the 113 professionals interviewed, a significant majority, accounting for 72.6%, were utilizing wearable technology in their professional settings. Among the remaining 31 interviewees who were not currently employing wearables, they either had experience with such technology in past roles, possessed considerable knowledge about its use, or were acquainted with wearable solutions through conferences and colleagues. Develop wearable technologies that align more closely with the specific needs and requirements of strength and conditioning coaches, athletic trainers, and other practitioners. This involves understanding their priorities and challenges and integrating features that directly address these concerns. Design wearables that can be customized to cater to the specific needs of different sports, athletes, and training philosophies. An adaptable and customizable approach ensures that the technology can be effectively utilized across diverse sports and athlete profiles.

Summary and Conclusions

With various features and functionalities, fitness trackers have emerged as essential instruments for tracking and improving physical fitness. Step counting is a crucial function that monitors a person's daily physical activity levels by counting the steps they take. Another essential tool is heart rate monitoring, which continuously measures users' heart rates to assist them in staying in their goal heart rate ranges for efficient workouts and to warn them of any health problems. Sleep tracking measures the length and quality of sleep, providing valuable data to enhance sleep habits, affecting general health and daily energy levels.

(Smith et al. Methodology review: A protocol to audit the representation of female athletes in sports science and sports medicine research) Smith talked about women's health in sports, and it helped gather the info needed to see which workouts and meal plans work best. It also helped get good male data. Frequent exercise has several advantages, such as better mental and physical health, successful weight management, and cardiovascular health. Regular exercise is a cornerstone of cardiovascular health improvement, as it positively impacts various cardiovascular risk factors. Aerobic exercises, for instance, contribute to lowering blood pressure, reducing levels of LDL cholesterol (often referred to as "bad" cholesterol), and increasing levels of HDL cholesterol (the "good" cholesterol). These advantages reduce the risk of heart disease, stroke, and other cardiovascular diseases when combined.

Moreover, physical activity is crucial in weight management and obesity prevention. It aids in burning calories, promoting fat loss, and maintaining a healthy body weight. Furthermore, maintaining a healthy weight and preventing obesity depend heavily on physical exercise. It supports fat loss, burns calories, and keeps the body weight healthy. Regular exercise helps people reach and maintain their targeted weight goals by raising their metabolic rate and lean muscle mass. The practice also has a significant positive impact on mental health. Endorphins are the body's natural mood enhancers that are released during exercise and are known to reduce stress, anxiety, and depression. Additionally, it improves self-esteem and cognitive function and encourages healthier sleep habits, all of which add to a general sense of well-being. Combining these health benefits emphasizes the importance of regular physical activity to live a more comprehensive and healthier lifestyle.

The importance of fitness trackers in encouraging a better lifestyle and enhancing general health outcomes is discussed in this documentation review. Fitness trackers empower users to set and meet their fitness goals by giving real-time information about heart rate, physical activity, and sleep habits. This serves as a personal motivator for individuals. Integrating fitness tracker data into medical care benefits healthcare providers by enabling more effective remote patient monitoring and customized treatment strategies. This integration can result in better results and more proactive healthcare management, particularly for chronic illnesses. Systemically, by preventing health disorders through proactive monitoring and prompt interventions, integrating fitness trackers into the healthcare system can lower healthcare costs and ease the strain on healthcare facilities. More study is necessary to investigate the long-term effectiveness of fitness trackers, their influence on chronic behavior modification, and the security and privacy concerns of incorporating such data into medical records. For a more thorough grasp of their potential and advantages, further research is needed to expand fitness tracker applications in specialized healthcare contexts like mental health and rehabilitation and investigate the possibility of AI-driven insights.

**METHODOLOGY**

Creating a fitness tracker is primarily about giving people a customizable, easy-to-use tool that they can incorporate into their daily routines and use to motivate themselves to actively participate in their health and well-being. With its sophisticated sensor technology, this cutting-edge gadget seeks to surpass traditional step counting by precisely monitoring various health markers. With its user-friendly design, individualized insights, and real-time statistics, the fitness tracker aims to encourage and assist people on their path to holistic wellness. By encouraging regular physical activity, sensible lifestyle choices, and the growth of a community dedicated to reaching optimal health, the ultimate goal is to cultivate a culture of health consciousness. Maintaining physical fitness is more than just looking good; it's about a whole-hearted dedication to health, energy, and a good quality of life. Sustaining bodily health has numerous advantages that affect different facets of a person's life. Simply put, maintaining physical fitness aims to foster a way of life that enhances mental clarity, physical health, and general well-being. It is an all-encompassing investment in oneself that considers one's mental, emotional, and physical well-being.

Population and Sampling Procedure

We will use a stratified random sampling approach to guarantee a representative sample for testing and improving the fitness tracker. This idea involves gathering relevant criteria to divide the target population into small subgroups and randomly choosing pieces from each group. The following actions are part of the sampling strategy:

* Identifying Groups:
  + Age Groups: Divide the population into age groups, such as 18–24, 25–34, etc.
  + Rank people according to their fitness level, considering classifications such as inactive, moderately active, and highly functional.
  + Lifestyle: Group people according to their fitness regimens and activity levels.
* Sampling at Random Within Group:
  + Participants should be chosen randomly from each age group to ensure proportionate representation.
  + Participants should be chosen randomly from each fitness level category to represent a range of activity levels.
  + Select people at random from different lifestyle groups to maintain diversity.
* Inclusion Criteria:
  + Participants must be willing to routinely use and test the fitness tracker to meet the inclusion criteria.
  + Participation of people with different degrees of experience with wearable technology.
  + Ensure people with varying health objectives are represented (weight control, cardiovascular health, etc.).
* Exclusion Criteria:
  + Those with health issues that would make it difficult to use the fitness tracker or participate in physical exercise are excluded.
  + Those with known allergies or sensitivities to materials are often utilized in wearable gadgets.
* Recruitment Channels:
  + To reach a varied audience, use community centers, fitness forums, and social media.
  + Work together with coaches and fitness influencers to attract participants.
  + Collaborate with medical professionals to guarantee that those with health issues are included.

The study intends to collect performance data and feedback from a wide range of people using this stratified random sampling technique. This idea will ensure that the fitness tracker is efficient, user-friendly, and fits the demands of a wide range of users within the specified target demographic.

Research Design and Development Procedures

Thoroughly describe your research plan. It should be laid out like a recipe that anyone can pick up, follow and recreate. Things to think about: programming platform used for software development. Decisions made in software development (and rationale). Describe any recruiting procedures and particular demographic information that will be collected. Describe how participants will be provided informed consent. Describe how data will be collected. Explain how participants exit the study (for example, debriefing procedures, etc.). Describe any follow-up procedures (such as requirements to return for follow-up interviews, treatments, etc.).

Describe the procedure for gaining access to the data set. Describe necessary permissions to gain access to the data (with permission letters located in an appendix.) If historical or legal documents are used as sources of data, demonstrate the reputability of the sources and justify why they represent the best sources of data. *Note*: This section may be 1-2 pages in length.

Instrumentation (if applicable)

If you are planning to use a survey, this is that section.

For published instruments, provide:

* Name of developer(s) and year of publication
* Appropriateness to the current study

For all researcher instruments provide:

* Basis for development (literature sources or other bases for development such as a pilot study).
* Establish sufficiency of instrumentation to answer research questions.

Operationalization. For each variable describe:

* Its operational definition.
* How each variable is measured or manipulated.
* How the variable / scale score is calculated, what the scores represent, and an example item.

*Note*: This section may be 1 pages in length.

Data Analysis Plan (if applicable)

How will you collect the information gathered from your project and assess it regarding your questions. Identify software used for analyses. Provide an explanation of data cleaning and screening procedures as appropriate to the study. Restate the research questions and hypotheses.

Describe in detail the analysis plan including the elements below.

* Statistical tests that will be used to test the research question(s)/hypothesis (es)
* Procedures used to account for multiple statistical tests, as appropriate
* How results will be interpreted (e.g., key parameter estimates, confidence intervals and / or probability values, odds ratios).
* Assumptions related to the selected hypotheses

*Note*: This section may be about 1 page in length.

Limitations

Think about your research projects design flaws. Describe limitations of the study related to design and / or methodological weaknesses (including issues related to limitations of internal and external validity, construct validity, and confounding variables.) Describe any biases that could influence study outcomes and how they are addressed. Describe reasonable measures to address limitations. *Notes*: For further guidance on this section, consult your Senior Research Associate or Statistician. This section should be less than 1 page in length.

Ethical Procedures & Considerations

Ethical Issues: Identify any ethical issues raised by your project.

* users' privacy expectations met by your project
* Can your project be abused by some users to cause harm to other users? or to the public at large? How do you mitigate it?
* Describe the treatment of human participants. Ethical concerns related to recruitment materials and processes and a plan to address them.
* Ethical concerns related to data collection/intervention activities (these could include participants refusing participation or early withdrawal from the study and response to any predicable adverse events) and a plan to address them.

Legal Issues: Identify any legal issues raised by your project.

* violating any licensing agreements? List all third-party software you plan to use and ensure that you have the right to use as you plan.
* any intellectual property constraints? or by the owner of some dataset you need to use? List them.
* Can your users use your project to break the law? post copyright works on your webapp? steal information? etc.

Security Issues: Identify any security issues raised by your project.

* Identify sensitive information kept by your software. Protection for confidential data (data storage procedures, data dissemination, who will have access to the data, and when the data will be destroyed.
* Identify possible attack vectors, that is, ways malicious users could try to use your project to escalate their privileges. Explain protection plan.
* Any agreements to gain access to participants or data.
* Whether data are anonymous or confidential and any concerns related to each.

Other ethical issues as applicable (these issues could include doing a study within one’s own work environment; conflict of interest or power differentials, and justification for use of incentives). *Note*: This section should be about 1 page in length.

**RESULTS**

Review briefly the purpose, research questions, and/or objectives. *Note*: This introduction to the chapter should be less than 1 page in length.

Study Results

Report findings, organized by research questions and/or objectives. Include tables and figures to illustrate results, as appropriate, and per the current edition of the *Publication Manual of the American Psychological Association*.

For statistical analyses include:

* Exact statistics and associated probability values.
* Confidence intervals around the statistics, as appropriate
* Effect sizes, as appropriate.

Report results of post-hoc analyses of statistical tests, if applicable. Report any additional statistical tests of hypotheses that emerged from the analysis of main hypotheses, as appropriate for the study.

*Note*: This section should be about 5-7 pages in length, or as many needed to present the results.

**DISCUSSION AND CONCLUSIONS**

Summarize the problem and purpose with similar language to what you used in the introduction. Summarize the methodology. *Note*: Consult your Research Advisor for further assistance with any of the sections in this chapter. This introduction to the chapter should be less than 1 page in length.

Summary of the Findings

This is where you will summarize the findings in your own words. Organize it by the research questions and/or objectives. This is where you are discussing how your results either answer or do not answer your research question (or support your research objective). Think of how you would describe your study findings to an interested colleague or family member. Keep the writing scholarly, but not overly technical or statistically heavy. Describe in what ways findings confirm, refute, or extend knowledge in the discipline by comparing them to the literature featured in your literature review. *Note:* This section can be at minimum 1-2 pages in length, but he length of this section varies depending on the study and design.

Global Impact of Computing Solution on Individuals, Organizations & Society

Discuss the local and global impact of computing solutions on individuals, organizations or society regarding your problem and proposed solution. Remember, computing solutions are software programs, applications, and systems that leverage technology to solve problems and streamline processes. Choose at least two of the five impacts to discuss their implications (local, global, individuals, organizations, society). Be sure to discuss potential benefits and challenges posed by these impacts.   *Note:* This section can be at about 1 pages in length.

Recommendations

Describe recommendations for further research that are grounded in the strengths and limitations of the current study as well as the literature reviewed in earlier sections. This is where you can bring a bit of yourself into the research. Think of ways that, in hindsight, you may have approached the study to elicit different results.

Ensure recommendations do not exceed study or ethical boundaries. *Note*: This section should be less than 1 pages in length.

Conclusions

Close with a strong “take away” message where you capture the key essence of the study for your reader. Be sure to mention the Significance of the Study as described in terms of (a) advancing theory, (b) advances in practice, and/or (c) filling a gap in the literature. **Why did this study matter.** *Note*: This section should be less than 1 page in length.

**REFERENCES**

Follow APA 7th edition formatting when listing your references.

Your reference list and your in-text citations should align!

**Appendix A: Title of Appendix**

If you are using a survey or particular documents, you can list them as an appendix.

YOUR CODE SHOULD BE INCLUDED AS AN APPENDIX