

Developing an Integrated Platform to Track Real Time Football Statistics for Somali Football Federation (SFF)

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Abstract—The integration of technology in sports has revolutionized how stakeholders interact with and perceive the game. This thesis presents the development of an integrated platform aimed at tracking real-time football statistics for the Somali Football Federation (SFF). Football, being one of the most popular sports globally, relies heavily on accurate and up-to-date statistical data for player performance analysis, team strategies, and fan engagement. The SFF, like many other federations, faces challenges in collecting, managing, and utilizing football statistics effectively. The advent of digital technologies and the internet has revolutionized data collection and dissemination methods across various fields, including sports. Traditional methods of data collection and analysis, which are often manual and time-consuming, can no longer meet the demands of modern football analytics. The platform encompasses a mobile application for fans, an admin panel for administrators, and a backend system for data management. Leveraging modern technologies such as Flutter for mobile development, Node.js and MySQL for backend services, and React for the admin interface, the system ensures comprehensive coverage of match events, player statistics, and tournament standings. Real-time updates facilitated by Socket.IO enhance user engagement and decision-making capabilities for coaches and administrators.

Keywords—Real-time football statistics; Integrated sports platform; Somali Football Federation (SFF); user engagement; sports technology

I. INTRODUCTION

The Somali Football Federation (SFF) is a national administrative body under the Confederation of African Football (CAF) that oversees and regulates football activities and competitions within the Federal Republic of Somalia. This includes managing the first, second, and third divisions, as well as the Inter-regional Cup. Additionally, the SFF is responsible for the management of the Somalia national football team. The SFF's primary mission is to promote and develop football throughout the country [1].

In recent years, there has been a significant rise in the adoption of data analytics within the sports industry. This surge is attributed to sports teams' growing recognition of the immense value data can offer in enhancing performance and gaining a competitive advantage [2].

In their seminal work on the evolving landscape of sports, [3] underscored the remarkable transformation of sports into a dynamic, multifaceted competition, particularly evident in football's burgeoning role as a significant branch of the business world. They highlighted the intricate strategic manoeuvres that now characterize the sport, emphasizing that even pivotal

moments within a match often elude both human perception and the most advanced camera technologies.

Despite the growing popularity and adoption of data analytics in sports, the SFF currently lacks a comprehensive real-time football match statistics system. In the absence of such a system, the federation faces several challenges in effectively harnessing the power of data analytics to enhance its analytical capabilities and improve decision-making processes [4]. Traditional methods of match analysis rely on post-match statistics, which are often time consuming and do not provide immediate insights into critical match events.

For the SFF, embracing real-time statistical analysis is not just about keeping pace with global trends; it's about unlocking new opportunities for growth and competitive advantage. Integrating such analytical approaches can significantly improve the tactical planning and performance analysis of Somali football teams. The insights gained from real-time data can help coaches make informed decisions, tailor training programs to address specific weaknesses, and develop strategies that exploit the opposition's vulnerabilities. Furthermore, as outlined by study [4] the development of technologies for tracking and analysis in sports can play a crucial role in enhancing team performance, which is particularly relevant for federations looking to optimize their resources and talent.

This study outlines the development of a real-time football statistics platform personalized to the Somali Football Federation (SFF). It explores the challenges faced by the federation, reviews advancements in sports, and details the design and implementation of a comprehensive system that integrates real-time updates, data management, and user-friendly interfaces. The platform aims to enhance decision-making, and fan engagement while addressing the lack of existing solutions for Somali football statistics.

II. LITERATURE REVIEW

The transition to real-time analysis in football marks a significant milestone in the sport's analytical journey. This shift was propelled by technological advancements, enabling the collection and analysis of data in real-time during matches. Systems like the one introduced by [5] for multi-view event detection in soccer games exemplify the capabilities of real-time analytics to provide immediate insights into player movements, ball trajectories, and game dynamics.

The development of sports analytics is underpinned by several key theories that guide the collection, analysis, and interpretation of data. These theories include statistical models for predicting outcomes, optimization theories for team

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composition and strategy, and performance analysis frameworks for evaluating player efficiency. For instance, the application of Poisson and negative binomial distributions to goal distributions in football, as discussed by [6], exemplifies the use of statistical models in sports analytics.

The literature review highlights several research gaps in the realm of real-time statistical analysis in football. One notable gap is the limited exploration of how these advanced analytics can be tailored and applied within the context of developing football nations, such as Somalia. Additionally, there is a need for real-time display of data which we hope to rectify [7].

This Research project aims to develop and implement a real-time football match statistics system to augment the analytical capabilities of the Somali Football Federation. This system will provide live updates on critical match events, including goals, cards, referees, and stadium information, thereby enhancing the viewing experience for fans and stakeholders alike. By leveraging real-time data insights, the federation seeks to empower coaches and decision-makers with the tools needed to make informed strategic choices and optimize player development programs [8].

Through the implementation of this real-time statistics system, the SFF aspires to set a new standard for football administration in the region, fostering greater engagement and interest in football across Somalia. This initiative represents a significant step towards embracing technology and innovation to propel Somali football into a new era of success and progress [9].

Researchers could focus on developing cost-effective and scalable analytics solutions that are accessible to football federations with limited resources. Investigating the integration of cultural and contextual factors into analytics models could also provide valuable insights, ensuring that the data interpretation is relevant and actionable for specific football environments [10]. Moreover, longitudinal studies on the impact of real-time analytics on player performance and injury prevention could significantly contribute to the field.

The study in [11] explore the use of machine learning in predicting football league standings and player performance, demonstrating how data-driven insights can enhance team strategies and performance optimization. This approach, applicable to real-time match statistics, can support the Somali Football Federation in making informed, data-driven decisions to improve player development and game strategies.

In addition to predictive models, the statistical dynamics of football have been extensively studied to understand the underlying mechanisms of the game. The study in [12] analyze the statistical dynamics of football, focusing on team behavior during matches. Their study applies statistical physics to understand game tactics, providing insights that can be integrated into real-time analytics systems. This can enhance decision-making for football federations like the SFF, helping improve tactical strategies during live matches.

Real-time football analytics have advanced with the development of sensors, machine learning, and computer vision technologies, enabling the collection of large amounts of data during matches. Technologies like wearable devices and video

analysis tools have transformed event tracking. Research on wearable technology shows how real-time biometric data can monitor player fitness, fatigue, and performance [13].

Studies by [14] have demonstrated the impact of well-designed visualizations in improving both player performance and fan engagement. This area could benefit from specific case studies on the design and usability of real-time systems tailored for football federations with varying levels of technical literacy and infrastructure, like the Somali Football Federation.

Another potential research gap could focus on the challenges of implementing real-time football analytics in countries with limited resources and infrastructure, such as Somalia. Research by study [15] highlights the barriers faced by sports organizations in developing nations, including financial constraints, technical know-how, and unreliable internet connectivity. Solutions such as low-cost data collection tools, offline-capable platforms, and mobile-based applications could be explored to bridge these gaps and make real-time football analytics more accessible.

These gaps and future research directions offer an exciting opportunity for the SFF and the academic community to contribute to the advancement of football analytics. By addressing these areas, there is potential to enhance the strategic application of analytics in football, promoting a more informed, effective, and competitive approach to the sport globally.

III. METHODOLOGY

Our research goal is to develop a comprehensive mobile application using Flutter, with a Node.js backend supported by MySQL, alongside a React-based admin panel. The primary objective is to create a platform that facilitates the management of Somali football statistics. This entails incorporating features such as real-time updates on match events, including goals, cards, and substitutions. Furthermore, the application will provide information on teams, referees, stadiums, match schedules, results, and standings, all presented in the Somali language to cater to the target audience. Notably, the absence of Somali football statistics APIs necessitates the dynamic entry of data through the React admin panel.

This platform prioritizes data security by implementing encrypted communication channels using TLS for real-time event broadcasting via Socket.IO. Authentication is managed through JWT to ensure secure access to sensitive data. Furthermore, player and fan data privacy is safeguarded by anonymizing personal data during statistical analysis and requiring user consent in data-sharing activities.

A. System Description

The system designed for the Somali Football Federation (SFF) is an integrated platform dedicated to tracking and managing real-time football statistics. This platform is tailored to meet the specific needs of Somali football, providing timely updates on key match events such as goals, cards, and substitutions. It also offers detailed information about teams, referees, stadiums, match schedules, results, and standings, ensuring a comprehensive view of the football landscape in Somalia. To cater to the local audience, the platform presents all data and content in the Somali language.

One of the system's core features is its ability to deliver real-time updates, making it a valuable tool for both fans and officials who require immediate access to match statistics. The platform's user interface is designed to be intuitive and accessible, with a focus on providing an engaging experience for users. Additionally, the system includes a React-admin panel, which allows authorized personnel to dynamically enter and manage data. This feature is particularly important due to the absence of existing APIs for Somali football statistics, ensuring that the platform remains accurate and up-to-date.

B. System Features

The application boasts a rich array of features designed to cater to the needs of Somali football enthusiasts. These features include:

Real-Time Goals: Users receive live updates on goals scored during matches.

Match Results: This feature enables users to quickly access match outcomes and review past performances.

Standings: Providing a snapshot of team rankings, this feature fosters healthy competition and engagement among fans of the teams.

Match Schedule: Users can plan and stay informed about upcoming matches.

Total Cards: This feature provides users with insights into the level of competitiveness and discipline exhibited by teams.

Substitutions: Users can track tactical changes made by teams during matches, gaining valuable insights into game strategies and player dynamics.

Referee Info: Transparency is maintained through the provision of information about the referees' officiating matches.

Stadium Information: This feature offers comprehensive details about the stadiums where matches are held.

Other tons of features that ensures comprehensive football platform.

C. System Requirements

The system requires hardware material and software programs, the most important requirement to run the platform are as follows:

1) Hardware requirements

a) Server: The server hosting the Node.js backend and MySQL database requires adequate CPU and RAM to support the application's backend operations effectively.

b) Mobile devices (Emulators): The mobile devices or emulators must be compatible with the Flutter framework.

c) Admin panel users: Standard computing devices, such as desktops or laptops, are required for accessing the React admin panel. These devices should have modern web browsers installed to ensure compatibility and smooth operation of the admin panel interface.

2) Software requirements

a) Mobile devices: The mobile devices must support the operating systems Android and iOS to run the Flutter application seamlessly.

b) Server: The server needs to have the Node.js runtime environment installed to execute the backend logic efficiently. Additionally, a MySQL database management system is essential for storing and managing the application data effectively.

c) Admin panel users: Admin panel users must have access to modern web browsers, such as Google Chrome, Mozilla Firefox, or Safari, to access and interact with the React admin panel seamlessly.

IV. SYSTEM ANALYSIS AND DESIGN

A. Current System and Drawbacks

Currently, the SFF relies on manual processes and social media posts, primarily Facebook, to update and inform stakeholders about match events such as goals, cards and substitutions. This approach has significant limitations:

- **Delayed Information:** Updates are not in real-time, which affects decision-making during matches.
- **Manual Entry:** The process is labour-intensive, time-consuming and prone high potential for human error.
- **Limited Coverage:** Big football apps like LiveScore and BeSoccer do not fully support Somali football, often displaying only match results with no detailed statistics.

B. Proposed System

The proposed system will leverage modern technology to provide a real-time football match statistics platform tailored to the needs of the SFF. The system will consist of a mobile application built with Flutter, a Node.js backend for data processing and APIs, and a React-based admin panel for managing data.

- **Real-Time Updates:** Live tracking of match events including goals, substitutions, and cards.
- **Comprehensive Data Management:** Admin panel for adding teams, scheduling matches, and managing tournament data.
- **User-Friendly Interface:** Mobile application in the Somali language for accessibility.
- **Socket.io Integration:** Real-time updates through WebSocket for immediate event broadcasting.

This personalized platform not only moderates the challenges of existing systems but also raises a stronger connection between football fans and their team.

C. System Design

Here there is level 1 diagram of the system to understand the system interaction, and how the layers of the platform work each other from fans using the application to the database and from the managers using the react admin panel to the database.

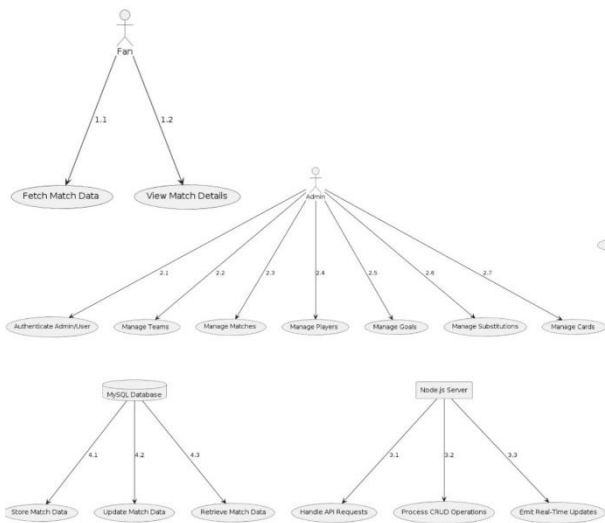


Fig. 1. Use case diagram.

Fig. 1 illustrates the system's use case diagram, which provides a detailed representation of the interactions between various user roles and the system components.

D. Database Design

The database used in this system is MySQL, chosen for its reliability and robustness in handling structured data.

The key tables in the database include Users, Teams, Matches, Players, Tournaments, Goals, Substitutions, and Many more. Each table is designed to store specific information relevant to the system's operation.

The ER Diagram below concludes main tables of the database and their relationship.

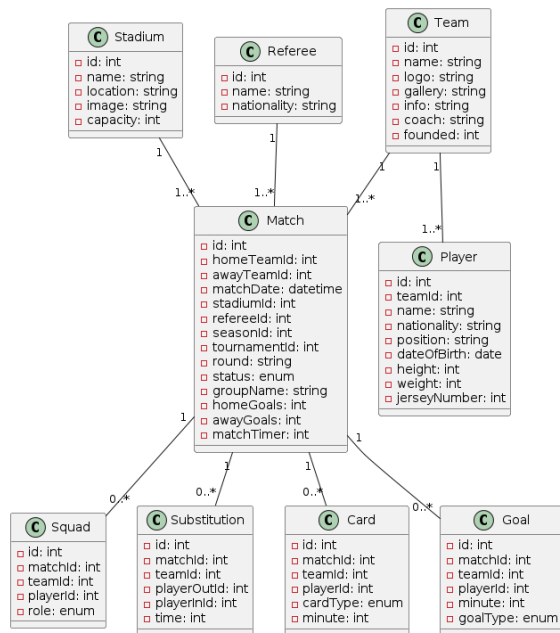


Fig. 2. Entity relationship diagram.

Fig. 2 presents the Entity-Relationship Diagram, showcasing the database structure and relationships among key entities like users, teams, and matches.

V. IMPLEMENTATION AND TESTING

Implemented the system using tools and technologies below.

- Mobile Application (Flutter and Dart) using IDE of Visual Studio Code with Packages like Provider, HTTP, Socket.IO.
- Backend Server (Node.js) using Express.js framework with MySQL database and tools like Socket.IO, JWT for authentication.
- Admin Panel (React).
- Hosting Localhost for development, cloud-based server for production in future.
- Development Tools o Version Control: Git, GitHub.

A. Testing Environment

Testing was conducted in several stages, including integration testing, application testing, and user acceptance testing (UAT). This testing environment was meticulously designed to replicate real-world conditions to ensure the accuracy and reliability of the tests.

B. System Snapshots

1) *Admin panel*: This figure shows that the admin panel is responsible for managing matches, where the management team can perform full CRUD operations. The same applies to other entities such as tournaments, seasons, teams, players, referees, etc.

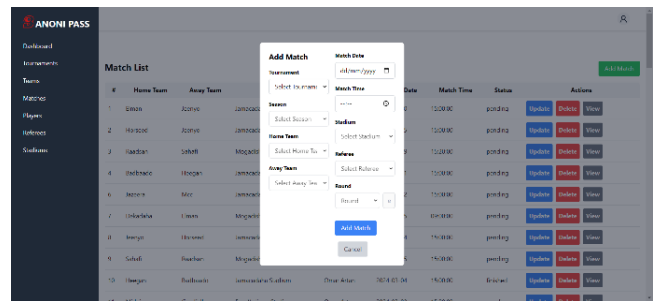


Fig. 3. Managing matches (Create new match).

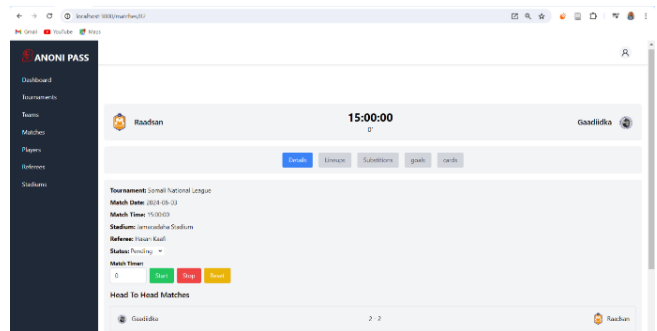


Fig. 4. Match event management.

This screen is responsible for managing match entities like goals, substitutions, cards, squads and also the status and the timer of the match for the platform (see Fig. 3 and Fig. 4).

2) *Mobile application:* This mobile application is designed to provide users with a seamless and engaging experience for tracking football matches and related data (Fig. 5).

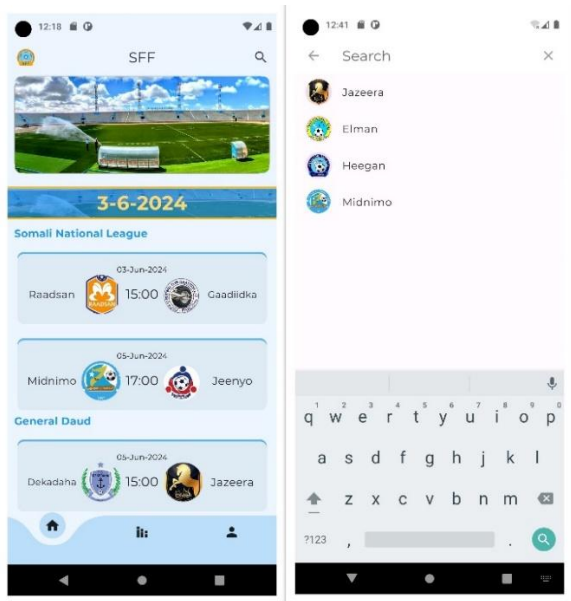


Fig. 5. Home screen (Recent matches).

This home dashboard serves as the main screen of the mobile application, displaying a list of matches organized by date, allowing users to browse upcoming and past matches. Users can select a desired date to filter and view relevant matches. Furthermore, the dashboard provides a search functionality, enabling users to easily search for specific teams and players.

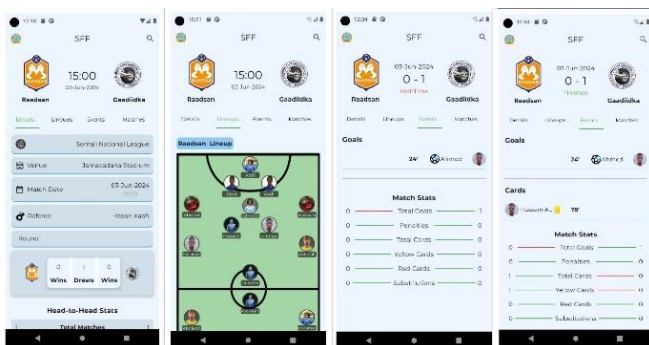


Fig. 6. Match details screen.

The match details (Fig. 6) screen provides a comprehensive overview of ongoing and completed matches. It includes real-time match information such as the teams' lineups (both starting lineup and bench), goals, cards, substitutions, and detailed match statistics that update in real-time. The interface also features head-to-head comparisons between the teams, allowing users to analyze historical encounters, past performance trends, and key statistics. This screen ensures users have all the essential details in one place, offering a dynamic and interactive experience for monitoring matches.

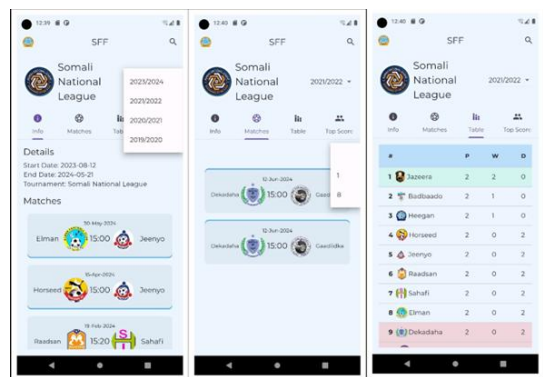


Fig. 7. Tournament details.

The Tournament Details (Fig. 7) Screen, filtered by season, displays a comprehensive list of matches for that particular tournament. As well as, this screen provides detailed tables showcasing the current team standings and top scorers of the tournament. This feature allows users to track team progress and individual player performance throughout the season, offering a clear and organized view of the tournament's key statistics and highlights.

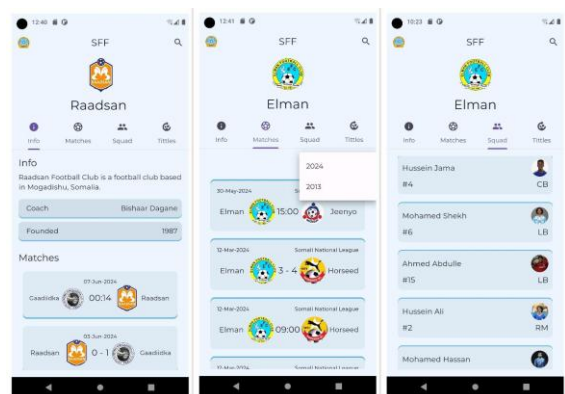


Fig. 8. Team details.

The Team (Fig. 8) Info screen offers an in-depth overview of the selected team, displaying key details such as the team's name, logo, founding year, coach, and other relevant information. The Matches section presents a list of games played by the team, conveniently grouped by year, with a dropdown menu allowing users to filter matches by a specific year. The Squad section showcases a list of players on the team, including each player's image, name, shirt number, and additional relevant information. The Team Titles section highlights the team's achievements and titles, giving users a clear view of the team's historical successes and accolades.

This section detailed the tools and technologies used. Snapshots of the mobile application, admin panel, backend, and database provided a visual representation of the system, illustrating its key features and interfaces.

C. Testing and Validation

Usability tests involved 100 users, including SFF administrators and football fans. Feedback from these sessions improved the navigation of the mobile app and the data-entry workflow of the React admin panel.

This system provides an opportunity to bridge technological gaps in Somali football by fostering transparency and engagement. However, challenges such as intermittent internet connectivity, low digital literacy, and limited funding remain. Solutions include integrating offline functionalities for the admin panel, offering training for administrators, and exploring partnerships with local ISPs to subsidize operational costs.

Validation metrics included:

- Socket.IO latency measured under various network conditions, achieving an average of 1.8 seconds.
- Data accuracy verified by cross-referencing system outputs with manual records during pilot matches.
- Admin panel functionality enabled full CRUD operations with a success rate of 100%.

VI. CONCLUSION AND FUTURE WORK

A. Conclusion

The development of the real-time football match statistics system for Somali Football Federation (SFF) has brought several key accomplishments. The system was developed to overcome the limitations of the existing manual processes and social media-based updates. One of the main achievements is its ability to provide live updates on match events, including the match timer, goals, substitutions, and cards, using Socket.IO technology. The system also covers a wide range of data, such as team and player details, match schedules, statistics, referee and stadium information, and tournament standings, including season-specific details.

Additionally, the system is designed with easy-to-use interfaces. The mobile app, built with Flutter, offers a smooth experience for fans in the Somali language, while the admin panel, developed in React, helps administrators manage data efficiently. Together, these features make the platform simple to use and effective for both users and administrators.

B. Future Work

The successful implementation of the real-time football match statistics system lays the foundation for future enhancements and expansions Including:

- **Analytics Incorporating:** Advanced analytics and machine learning capabilities could provide deeper insights into player performance, team strategies, and match outcomes.
- **Expanded Features:** Introducing new features such as video highlights push notifications for match events, social sharing options, and interactive visualizations of match statistics could further enrich the user experience and engagement with the system.
- **Machine Learning Integration** Integrate machine learning algorithms to provide personalized recommendations for users, such as suggested matches to watch or teams to follow based on their preferences and viewing history.

- **Integration with Other Platforms:** Integrating the system with other popular football platforms and social media channels could increase visibility and reach.

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