

STRATEX : STRATEGIC TAKRAW EXPERIENCE

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ABSTRACT

Sepak takraw is a traditional sport in Southeast Asia that requires a high level of agility, coordination, and tactical awareness. In many cases, performance analysis is still carried out through manual observation, which may limit the accuracy of the analysis and reduce understanding of in-game strategies. To overcome this limitation, StratEx (Strategic Takraw Experience) was developed as a mobile application that integrates geospatial technology with data visualization techniques for performance analysis. The application records the locations where the ball lands on a digital court and converts this spatial data into heat maps, allowing areas of high activity to be clearly identified. Through this spatial representation, coaches are able to better understand team movement patterns, identify strengths and weaknesses, and support more effective tactical decision-making. Overall, the use of geospatial visualization in sports analytics demonstrates a practical approach to enhancing performance evaluation while supporting the digital transformation of traditional sports.

Keywords: Geospatial Technology, Sports Analytics, Data Visualization, Sepak Takraw, Heat Map

INTRODUCTION

Sepak takraw is a traditional sport in Southeast Asia that requires agility, coordination, and good teamwork. In most cases, performance analysis in sepak takraw is still carried out through manual observation by coaches, which can be subjective and time-consuming. Important spatial information such as ball landing positions is rarely recorded in a structured way, making it difficult to fully understand gameplay patterns and team performance [1]. Several studies have shown that digital technologies and spatial visualization can help improve sports performance analysis by providing clearer and more objective insights [2][3]. Heat map visualization is commonly used to identify active play areas and tactical patterns during a match [3]. However, the use of geospatial technology for performance analysis in sepak takraw is still limited, and most existing methods do not fully utilise spatial data in a systematic manner. To overcome this limitation, the StratEx (Strategic Takraw Experience) project is developed as a mobile-based application that integrates geospatial technology with data visualization. This project aims to record ball landing positions on a digital takraw court and convert the data into heat map visualizations to support match analysis. The novelty of StratEx lies in its simple yet effective application of geospatial visualization for a traditional sport, providing a more practical and data-driven approach to assist coaches and players in performance evaluation.

METHODOLOGY

The StratEx system was developed using the System Development Life Cycle (SDLC) Waterfall methodology to ensure a structured and systematic development process. During the design phase, the system architecture was planned by integrating Flutter for the mobile application interface, Firebase for backend services and data storage, and Leaflet.js for geospatial visualization. A digital takraw court layout was also designed to enable accurate, coordinate-based data input.

In the development phase, core functionalities such as tap-based recording of ball landing positions, match data storage, and dashboard visualization were implemented. Through geospatial integration, the recorded spatial coordinates were processed and displayed as interactive heat maps, allowing match activity to be visualised more effectively. Finally, comprehensive system testing was carried out to verify data accuracy, usability of the interface, and overall system stability before completing the final documentation.

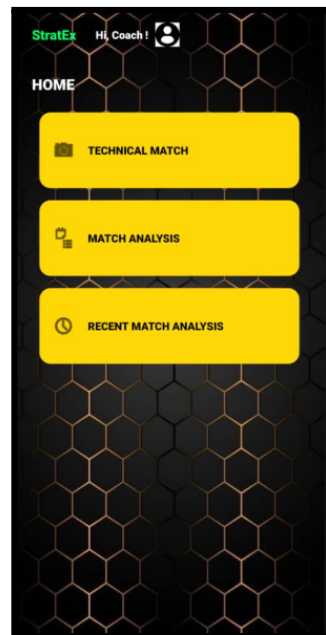


Figure 1 : The Main Menu in the Applications

Figure 1 illustrates the overall methodology of the StratEx system development based on the SDLC Waterfall model, which consists of requirement analysis, system design, development, testing, and documentation to ensure a structured and systematic development process.

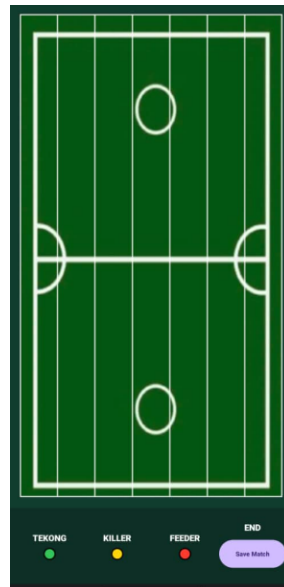


Figure 2: Digital Sepak Takraw Court Layout for Ball Landing Data Collection

Figure 2 shows the system architecture of StratEx, where Flutter is used for mobile application development, Firebase for backend data storage, and Leaflet.js for geospatial visualization of ball landing positions on a digital takraw court.

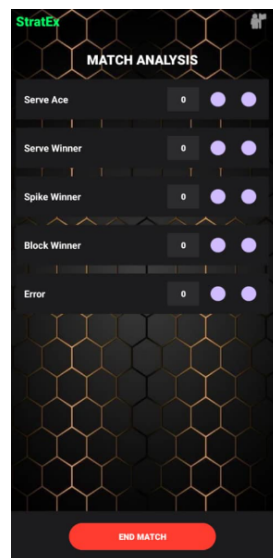


Figure 3: StratEx System Workflow from Data Input to Heatmap Visualization

Figure 3 presents the workflow of the StratEx system, starting from tap-based ball landing data input, followed by coordinate processing, data storage, and transformation into heat map visualizations for tactical performance analysis.

RESULT AND DISCUSSION

The StratEx prototype was able to successfully record ball landing positions and transform the collected spatial data into heat map visualizations that reflect gameplay intensity. The resulting heat maps clearly highlighted high-activity areas on the court, allowing coaches to quickly identify tactical strengths and weaknesses. The use of tap-based coordinate input combined with automated visualization supported a more efficient and effective approach to performance analysis.

Feedback from user evaluation indicated that StratEx helped reduce the time required for manual analysis and provided clearer insights compared to traditional observation methods. While the system currently relies on internet connectivity and does not include automated player tracking, the integration of geospatial visualization was shown to be effective in improving tactical understanding and overall performance evaluation in sepak takraw..

CONCLUSION

StratEx demonstrates how geospatial technology can be effectively integrated with mobile application development to support performance analysis in sepak takraw. The system enhances the accuracy, efficiency, and clarity of tactical evaluation, making match analysis more systematic and easier to interpret. Overall, this prototype provides a solid foundation for future development of more advanced, data-driven sports analytics tools, particularly within the Malaysian sports context.

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