

Design of Digital Scoreboard for Badminton Match Based on Desktop Computer

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ABSTRACT

The scoreboard is a crucial component in every sports match, including badminton, which displays score information accurately. The transformation of technology in the digital era has brought a revolution in various aspects of life, including in sports, where digital scoreboards are a superior alternative to conventional methods. The design of a desktop computer-based digital scoreboard for badminton matches offers several significant advantages, such as better visibility, ease of use, and the ability to display additional information such as player teams, club logos, and match times. Experimental studies show that this scoreboard operates with a score calculation accuracy of up to 98% and gets a user satisfaction rate of 94% regarding ease of operation. These results indicate that this digital scoreboard can run well and effectively facilitate score calculation in badminton matches.

Keywords: *Badminton, Desktop Computer, Scoreboard*

ABSTRAK

Scoreboard merupakan komponen krusial dalam setiap pertandingan olahraga, termasuk badminton, yang berfungsi untuk menampilkan informasi skor secara akurat. Transformasi teknologi di era digital telah membawa revolusi dalam berbagai aspek kehidupan, termasuk dalam bidang olahraga, di mana score board digital menjadi alternatif yang superior dibandingkan dengan metode konvensional. Perancangan scoreboard digital berbasis desktop komputer untuk pertandingan badminton menawarkan sejumlah keunggulan signifikan, seperti visibilitas yang lebih baik, kemudahan penggunaan, dan kemampuan untuk menampilkan informasi tambahan seperti tim pemain, logo klub, dan waktu pertandingan. Studi eksperimen menunjukkan bahwa scoreboard ini beroperasi dengan akurasi perhitungan skor hingga 98% dan mendapatkan tingkat kepuasan pengguna sebesar 94% dalam hal kemudahan pengoperasian. Hasil tersebut mengindikasikan bahwa scoreboard digital ini dapat berjalan dengan baik dan efektif memudahkan perhitungan skor dalam pertandingan badminton.

Kata kunci: *Badminton, Komputer desktop, Scoreboard*

I. INTRODUCTION

Badminton is among the most popular sports in various parts of the world, including Indonesia. This sport is popular among professionals and the general public as a recreational and fitness activity. In every badminton match, whether at the amateur or

professional level, scoring is a crucial element in determining the winner fairly and accurately [1][2].

Traditionally, scoring in badminton matches was done manually using a simple blackboard or Flipboard. Although effective in its time, this method had several limitations, such as the potential for human

error in recording scores and the lack of visibility for spectators, especially in large arenas or stadiums.

Along with the development of technology, electronic scoreboards began to be introduced in education to overcome the weaknesses of the manual method [3]. Electronic scoreboards offer the advantages of easy reading of match results in real-time and high accuracy in recording scores [4][5][6]. However, the implementation of this device requires high costs and supporting infrastructure that is not always available in all-match venues..

Although electronic scoreboards have solved some of the problems of manual systems, there are still challenges related to accessibility and implementation costs, especially for small communities or schools with limited budgets. Therefore, innovation is needed: developing a more affordable but still functional and efficient digital scoreboard based on mobile applications [6][7] and desktop computers [8].

The development of a desktop-based scoreboard offers a practical solution: using personal computer (PC) hardware that is widely owned by the general public today without additional investment in special equipment other than the application software itself [9][10]. By utilizing a

computer program as the main media for displaying a digital scoreboard, the flexibility of the user interface design becomes easier to adjust according to the specific needs of each badminton sporting event. This scoreboard can improve the user experience, both for players and spectators, while maintaining the transparency of the competition.

This study aims to design an innovative digital scoreboard system based on a desktop platform to provide fast, accurate, and easy-to-use match result recording services. The benefits of this scoreboard are that it reduces the risk of data input errors due to human error during the match. In addition, it can also be widely used in local and national competitions without having to spend a lot of money on procuring special devices such as traditional electric scoreboards.

II. RESEARCH METHOD

A scoreboard is a tool used to display the score in a match, and in this study, we designed it using a visual program based on a computer desktop display. This scoreboard display includes the score numbers for Team A and Team B and is equipped with a digital clock that allows monitoring of the match time in real time. Figure 1 shows how this scoreboard design is implemented on a

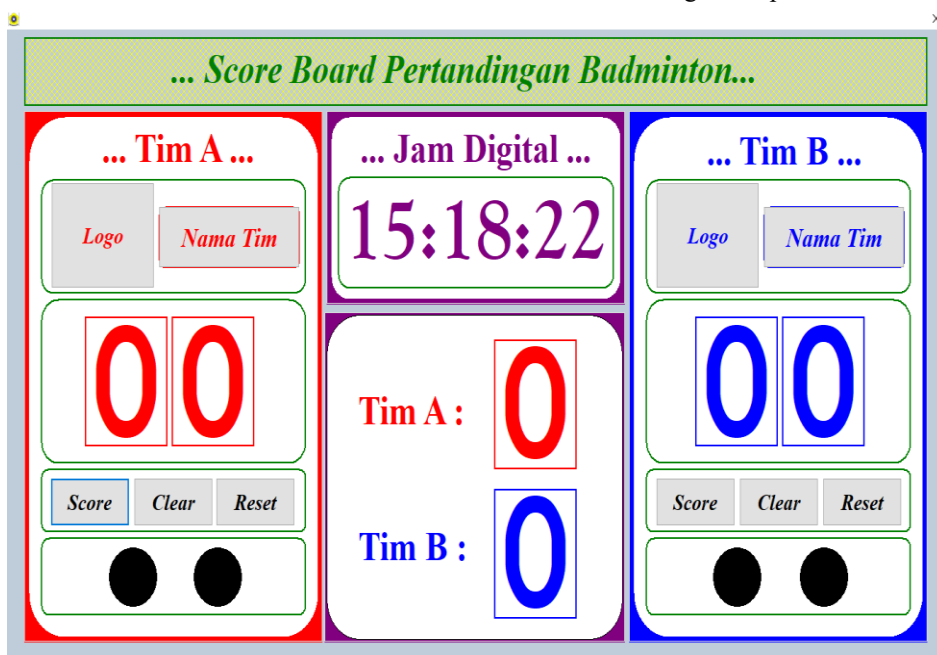


Figure 1. Scoreboard in computer desktop view.

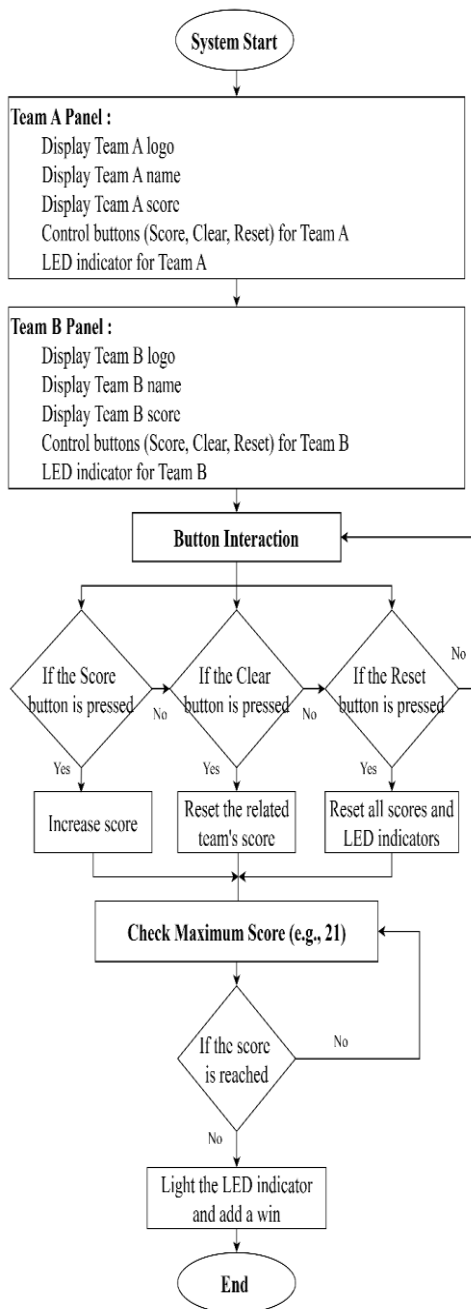


Figure 2. Flowchart of a digital scoreboard system.

computer desktop display. This design makes it easier for users to record and update the score numbers during the match. Although many other digital electronic technology-based scoreboards are available, our design

offers a practical and efficient solution for sports event organizers who want a functional yet straightforward score recording system.

Figure 1 shows a visual display of a badminton match scoreboard application on a computer desktop. This scoreboard consists of three main parts: the panel for Team A on the left, the digital clock panel in the middle, and Team B on the right. Each team panel has a logo and team name column and features for adding scores, deleting scores, and resetting. The score numbers are displayed in large sizes, making them easy for users and spectators to read. In the upper center, a digital clock displays the match time in real time, making monitoring the game's duration easier. In addition, there is also a black round indicator (Led) as a marker for additional points for each team. This interface design is made informative but straightforward to make it easier for operators to input data during the match and provide clear information to all participants and spectators of the badminton match. Figure 2 shows a flowchart of a digital scoreboard system.



Figure 3. The three main buttons on the scoreboard.

There are three main buttons on the scoreboard of Team A and Team B, namely "Score," "Clear," and "Reset," as shown in Figure 3. The "Score" button increases the score each time it is pressed, making recording points during the match easier. If the score is miscalculated, the referee can right-click the "Score" button, and then the score will be reduced by one point. The "Clear" button deletes the recorded score and resets the score value to zero. Meanwhile, the "Reset" button deletes the score and resets all LED indicators to their original positions. This interface design allows users to manage and update information easily during the match. The algorithm for the "Score," "Clear," and "Reset" buttons are shown in Figure 4.

```

ALGORITHM Score
INITIALIZATION
  score ← 0
  i ← 0
  led[1,2] ← OFF

DESCRIPTION
  score ← score + 1
  Update_Display()
  // Update the number on
  // the display

  IF score ≥ 21 THEN
    led[i] ← ON
    i ← i + 1
  END IF
END ALGORITHM Score

```

(a)

```

ALGORITHM Clear
DESCRIPTION
  score ← 0
  Update_Display()
END ALGORITHM Clear

```

(b)

```

ALGORITHM Reset
DESCRIPTION
  score ← 0
  Update_Display()

  FOR i FROM 0 TO 20 DO
    led[i] ← OFF
  END FOR

  count ← 0
  // Reset the winning
  // score to 0
END ALGORITHM Reset

```

(c)

Figure 4. Scoreboard algorithm, (a). on the “Score” (b). “Clear”, and (c). “Reset” buttons.

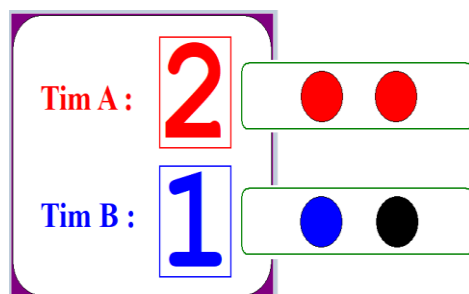


Figure 5. Winning score indicator for each team.

Repeating the “Score” button will increase the number on the counter from 0 to 21. When the score reaches 21, the LED light will light up to indicate the score limit has been reached. Furthermore, the display on the team display will automatically increase the number of wins as a marker of the team’s success. Figure 5 shows a visual

representation of the winning score for each team. The algorithm for adding winning scores for each team is shown in Figure 6.

```

ALGORITHM winning_score
INITIALIZATION
  count ← 0

DESCRIPTION
  IF score = 21 THEN
    count ← count + 1
  END IF

  IF count = 2 THEN
    DISPLAY "Team A or
    B is the winner"
  END IF
END ALGORITHM winning_score

```

Figure 6. Winning score algorithm in each round of the match.

III. RESULTS AND DISCUSSION

This digital scoreboard is designed with a desktop display using a computer visual program to facilitate operation. This scoreboard is used specifically in badminton matches held in the Electrical Engineering Department of UNSRI. The implementation of the scoreboard on a smart TV display can be seen in Figure 7, which shows how the match results are displayed in real time to the audience. In addition, the referee or committee can manually input the logo and name of the team before the match starts so that the information displayed is always accurate and by field conditions.



Figure 7. Implement the scoreboard in smart TV display at the Electrical Engineering Department, UNSRI.

Figure 8 shows the logo and name of each team. In this study, Team A was named Lab. Coci, while Team B was named Lab. Information Technology. If the match is played individually, the team logo can be replaced with a photo file of the player concerned. In addition, a digital clock is also

displayed on the scoreboard to provide accurate time information during the match.

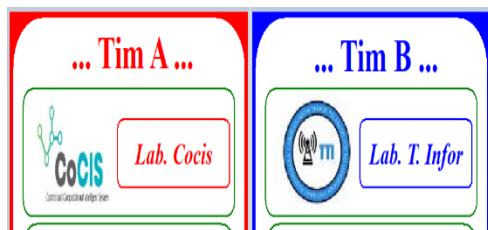


Figure 8. Team logo and name after being successfully entered by the user.

Next, the score addition experiment is done by clicking the "Score" button. Each time the button is clicked using the left click, the score will increase by one point, while if clicked using the right click, the score will decrease by one point. The referee uses the right-click function to correct errors in the score input and match the actual conditions on the field. Figure 9 shows the score addition process on the display. When this score addition reaches 21, the LED indicator changes color to red as a sign of winning in one round. In addition, there is an additional winning score for the team that successfully reaches 21 (see Figure 9).

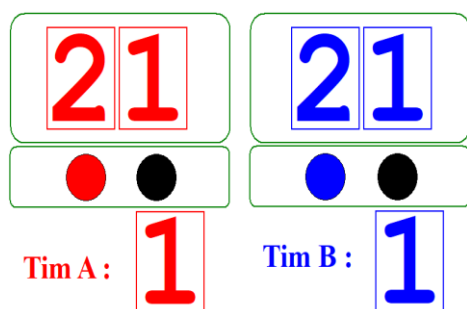


Figure 9. Addition of scores, active LEDs and addition of winning points for each team.

The "Score" button works well in scoreboard operation, as do the "Clear" and "Reset" buttons. When the "Clear" button is clicked, the score display on the display will return to zero. Meanwhile, when the "Reset" button is clicked, all elements on the scoreboard, including the score display on the display, LED indicators, and winning points, will return to their initial position or condition before the match starts.

This scoreboard has also been tested in displaying accurate winning team information. The winning category is

displayed through a dialogue form containing information about Team A or Team B as the winner of the match. Figure 9 shows the dialogue form, where Figure 10.a shows Team A is declared the winner because it has more winning points than Team B. Conversely, Figure 10.b shows that Team B is the winner with higher points and the appropriate winning information form is displayed. This system functions well and is reliable, so it is worthy of being used as a replacement for electronic or traditional scoreboards.

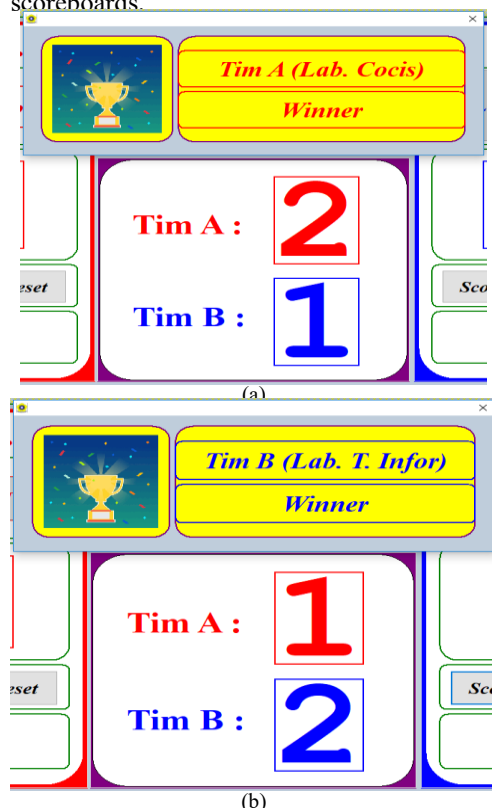


Figure 10. Winning information of a team, (a) Team A, and (b) Team B.

IV. CONCLUSION

This study successfully developed a desktop computer-based digital scoreboard that provides a practical and efficient solution for recording badminton match scores. This system can display scores in real-time well and is equipped with essential features such as adding, subtracting, deleting scores, resetting the display, LED indicators as score limit markers, and a winner

information dialogue form. Implementing a smart TV display also expands the visibility of match results to the audience. The ability to manually enter team logos and names by referees or committees adds flexibility to use at various levels of competition. Testing shows that the system functions well and can replace traditional electronic and manual scoreboards. As a suggestion for further development, add an online platform integration feature to store match results in a database. Improvements to the user interface are also needed to make it more intuitive for novice operators.

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