An automatically scoring structure of a dartboard which comprises a board body, at least two camera modules, a processing module and a display module is provided. The board body has a board-surface. The at least two camera modules comprise a first camera module and a second camera module. The first camera module retrieves a first image of the board-surface through a first angle, while the second camera module retrieves a second image of the board-surface through a second angle. The processing module which is electrically connected to the at least two camera modules determines a location of at least one dart according to the first and second images, and calculates a score according to the location of the at least one dart. The display module displays the score.
AUTOMATICALLY SCORING STRUCTURE OF A DARTBOARD

[0001] This application claims the benefit from the priority of China Patent Application No. 200920168027.6 filed on Aug. 6, 2009, the disclosures of which are incorporated by reference herein in their entirety.

CROSS-REFERENCES TO RELATED APPLICATIONS

[0002] Not applicable.

BACKGROUND OF THE INVENTION

[0003] 1. Field of the Invention
[0004] The present invention relates to a dartboard; in particular, to an automatically scoring structure of a dartboard.
[0005] 2. Descriptions of the Related Art
[0006] Casual and competitive dartboard games have been popular pastimes. The determinations of wins/loses and scores of the dartboard game are based on the ability of the players to throw darts onto the board surface. At the same time, the scores are calculated and recorded; and the automatically scoring system of a dartboard can be used on the board body made with various material types.

SUMMARY OF THE INVENTION

[0010] The primary objective of this invention is to provide an automatically scoring structure of a dartboard which comprehensively considers the speed, accuracy and fairness in score calculation and that is applicable on board bodies made from various types of materials.

[0011] To achieve the aforesaid objective, this invention provides an automatically scoring structure of a dartboard comprising a board body, at least two camera modules, a processing module and a display module. The board body has a board surface. The at least two camera modules include respectively a first camera module and a second camera module. The first camera module captures a first image of the board surface at a first angle, and the second camera module captures a second image of the board surface at a second angle. The processing module is electrically connected to the at least two camera modules, and the display module displays the identification of a participant, the score and other related information.

[0012] According to the above contents, the automatically scoring structure of the dartboard can be disposed onto the board body made from any type of materials currently on the market. At least two camera modules are employed to rapidly and accurately determine the hitting points of the dart onto the board surface at the same time, such that the participant could focus on throwing darts, and the dartboard competition could proceed smoothly and fairly.

[0013] The detailed technology and preferred embodiments implemented for the subject invention are described in the following paragraphs accompanying the appended drawings for people skilled in this field to well appreciate the features of the claimed invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a schematic view of a dartboard of a first preferred embodiment of the present invention;
[0015] FIG. 2A is a perspective view schematically showing the first preferred embodiment of the present invention;
[0016] FIG. 2B is the bottom view of the first preferred embodiment of the present invention;
[0017] FIG. 3A is another perspective view schematically showing the first preferred embodiment of the present invention;
[0018] FIG. 3B is another bottom view of the first preferred embodiment of the present invention;
[0019] FIG. 4A is a perspective view schematically showing a second preferred embodiment in accordance with the present invention; and
[0020] FIG. 4B is a bottom view of the second preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0021] The following preferred embodiments are used to describe an automatically scoring structure of a dartboard. The description of the preferred embodiments is used to construe the objects of the present invention and is not a limita-
tion of the claims thereof. Those non-directly related elements of the present invention have been omitted from the drawings, and the specific dimensions of the elements shown in the drawings are meant for the understanding of the invention and are not a limitation on the actual size of the elements.

[0022] FIG. 1 illustrates schematically a first preferred embodiment of an automatically scoring structure of a dartboard 1 of the present invention. The automatically scoring structure of a dartboard 1 comprises a board body 11, a first camera module 13, a second camera module 14, a case 15, a processing module 16 and a display module 17. The board body 11, the first camera module 13 and the second camera module 14 are disposed in the case 15 which is portable and convenient to be used together. The board body 11 of the present invention can be any board body available in the market or the standard board body used in the competitions, such as one-piece bristol board bodies, wooden board bodies, wound paper board bodies and flocked board bodies. In accordance with the preferred embodiment of the present invention, the board body is not restricted to any specific materials. FIGS. 2A and 3A are three-dimensional views schematically illustrating the first preferred embodiment of the present invention. FIGS. 2B and 3B are top views of the first preferred embodiment. Substantially, the board body 11 has a board-surface 110. When a participant throws a dart 121 onto the board-surface 110, the first camera module 13 captures a first image 132 of the board-surface 110 via a first angle 131. Simultaneously, the second camera module 14 captures a second image 142 of the board-surface 110 via a second angle 141.

[0023] Specifically, in accordance with the present invention, the first angle 131 is the included angle of the board-surface 110 with the normal line of the plane of the lens of the first camera module 13; the second angle 141 is the included angle of the board-surface 110 with the normal line of the plane of the lens of the second camera module 14. The first image 132 and the second image 142 respectively represent the entire range of images of the two different viewing angles covering the board-surface 110. It should be noted that, the value of the included angle of the board-surface 110 of the board body 11 with the normal line of the plane of the lens of the first camera module 13 and the value of the included angle of the board-surface 110 of the board body 11 with the normal line of the plane of the lens of the second camera module 14 are between the range from 0° to 90°, preferably, from 30° to 40°.

[0024] After that, the processing module 16 which is electronically connected to the first camera module 13 and the second camera module 14, receives the first image 132 and the second image 142 therefrom respectively. The hitting point of the dart 121 onto the board-surface 110 is determined according to the first image 132 and the second image 142. Simultaneously, a score 161 is calculated according to the hitting point of the dart 121. It should be appreciated that if only a single camera module is employed; there may be an error when the darts are mutually covered. Thus, to prevent such a possibility, in the preferred embodiment of the present invention, at least two camera modules are employed. Consequently, multiple images can be used as the basis to accurately determine the hitting point of the dart.

[0025] Upon calculation of the score 161 of the dart 121 by the processing module 16, the score 161 is transmitted to the display module 17. The processing module 16 is further used to record the score 161 so that an accumulation score can be calculated. The display module 17 is used to display the score 161 of the dart 121.

[0026] When a participant throws the dart 122 onto the board-surface 110, the first camera module 13 captures a third image 134 of the board-surface 110 via the same first angle 131. Simultaneously, the second camera module 14 captures a fourth image 144 of the board-surface 110 via the same second angle 141.

[0027] Subsequently, the processing module 16, being electrically connected to the first camera module 13 and the second camera module 14, receives the third image 134 and the fourth image 144 therefrom respectively, and determines the position of the hitting point of the dart 122 onto the board-surface 110 according to the third image 134 and the fourth image 144. Simultaneously, another score 163 is calculated according to the hitting point of the dart 122. After the processing module 16 has calculated the score 163 of the dart 122, the score 163 and the previously recorded score 161 are added to obtain an accumulation score 165. The score 163 is transmitted to the display module 17. After that, the display module 17 displays the score 163 of the dart 122 and the accumulation score 165 of the darts 121 and 122. Thus, the subsequent calculation and display of the score 161 of the dart 121 and the score 163 of the dart 122 will be public and accurate by means of the processing module 16 and the display module 17.

[0028] Emphatically, the display module 17 can be configured and designed such that it synchronizes competition information of the competitions. The competition information can be standard scores 161, 163 and/or the accumulation score 165. The competition information also includes a user identification which represents the participation number of the participant and the throw dart numbers which represent the number of the darts having been thrown by a participant. The display module 17 is not restricted to display score related information, but it can further display related competition information.

[0029] FIG. 4A is a three-dimensional view schematically illustrating a second preferred embodiment. FIG. 4B is a top view of the second preferred embodiment. In the second preferred embodiment, the method of operation and the configuration of the individual elements are similar to that of the first preferred embodiment. The difference between the first preferred embodiment and the second preferred embodiment is that a third camera module 18 is mounted in the second preferred embodiment.

[0030] The third camera module 18 is electrically connected to the processing module 16 and the operation thereof is similar to that of the first camera module 13 or the second camera module 14. Thus, the description related to the third camera module 18 will not be repeated. By employing the images of the board-surface 110 captured by the first camera module 13 and the second camera module 14 together with the images of the board-surface 110 captured by the third camera 18, the processing module 16 could further accurately determines the positions of the hitting points of the darts 121, 122 on the board-surface 110 by using the three images at different angles. Thus, the calculation of score is more precise.

[0031] In the present application, the number of camera modules is not restricted to two, but the number could be increased (to three or more than four) if necessary to attain the complete efficiency of the present invention.
[0032] In view of the above, the automatically scoring structure of a dartboard can be employed on any board body made from any types of material. At the same time, at least two camera modules are employed to capture images, and to quickly and precisely determine the position of the hitting point of the dart on the board-surface. Thus, it allows a smooth dartboard competition. In addition, the electronic method of score calculation will prevent the competition delay as would otherwise result from manual calculation and record, and also prevent the darts from falling outside the boundary, which can be caused often when using the plastic bodies. Thus, the present invention enables a dart competition with fair results.

[0033] The above disclosure is related to the detailed technical contents and inventive features thereof. People skilled in this field may proceed with a variety of modifications and replacements based on the disclosures and suggestions of the invention as described without departing from the characteristics thereof. Nevertheless, although such modifications and replacements are not fully disclosed in the above descriptions, they have substantially been covered in the following claims as appended.

What is claimed is:

1. An automatically scoring structure of a dartboard, comprising:
   - a board body, having a board-surface;
   - at least two camera modules, including a first camera module and a second camera module, the first camera module capturing a first image of the board-surface at a first angle, the second camera module capturing a second image of the board-surface at a second angle;
   - a processing module, electrically connected to the at least two camera modules, being configured to determine a position of at least one dart according to the first image and the second image, and being capable of calculating a score according to the position of the at least one dart; and
   - a display module, being configured to display the score.

2. The automatically scoring structure as claimed in claim 1, further comprising a case, wherein the board body and the at least two camera modules are disposed in the case.

3. The automatically scoring structure as claimed in claim 1, wherein the processing module is further configured to record the score.

4. The automatically scoring structure as claimed in claim 1, wherein the first angle and the second angle are respectively between 0° and 90°.

5. The automatically scoring structure as claimed in claim 1, wherein the first angle and the second angle are respectively between 30° and 60°.

6. The automatically scoring structure as claimed in claim 1, wherein the display module is further configured to display competition information.

7. The automatically scoring structure as claimed in claim 1, wherein the competition information comprises a user identification, a thrown dart number and an accumulation score.

8. The automatically scoring structure as claimed in claim 1, wherein the board body is a one-piece bristol board body.

9. The automatically scoring structure as claimed in claim 1, wherein the board body is a one-piece wooden board body.

10. The automatically scoring structure as claimed in claim 1, wherein the board body is a one-piece wound paper board body.

11. The automatically scoring structure as claimed in claim 1, wherein the board body is a one-piece flocked board body.