International Journal of Physical Education and Sports
www.phyedusports.in
Volume: 2, Issue: 7, Pages: 18-20, Year: 2017
Impact Factor: 3.125 (RIF)

ISSN- 2456-2963

Advance technology in sports and games

Kulbeer Singh[1],

[1] Assistant Professor, Malwa College of Physical Education, Bathinda, Punjab, India.

Received June 13, 2017; Accepted June 30, 2017; Published July 20, 2017

Abstract

Technology has gone a long way in proving its mettle in sports. It has created a niche for itself in every major sport on the planet. Be it the outdoor sports like soccer, tennis or cricket or their indoor counterparts like snooker, badminton or basketball, technology is used in each one of them. The system works via six (sometimes seven) high-performance cameras, normally positioned on the underside of the stadium roof, which track the ball from different angles. The video from the six cameras is then triangulated and combined to create a three-dimensional representation of the trajectory of the ball. Hawk-Eye is not infallible and is accurate to within 5 millimeters (0.19 inch) but is generally trusted as an impartial second opinion in sports. Hot Spot uses two infra-red cameras positioned at either end of the ground. These cameras sense and measure heat from friction generated by a collision, such as ball on pad, ball on bat, ball on ground or ball on glove. Using a subtraction technique a series of black-and-white negative frames is generated into a computer, precisely localizing the ball's point of contact. Instant replay is a video reproduction of something that recently occurred which was both shot and broadcast live. The video, having already been shown live, is replayed in order for viewers to see again and analyze what had just taken place.

Key words: Technology, Sports.

1. Introduction

Technology has gone a long way in proving its mettle in sports. It has created a niche for itself in every major sport on the planet. Be it the outdoor sports like soccer, tennis or cricket or their indoor counterparts like snooker, badminton or basketball, technology is used in each one of them.

1.1 Hawk-Eye

Hawk-Eye was developed in the United Kingdom by Dr. Paul Hawkins. The system was originally implemented in 2001 for television purposes in cricket. The system works via six (sometimes seven) high-performance cameras, normally positioned on the underside of the stadium roof, which track the ball from different angles. The video from the six cameras is then triangulated and combined to create a three-dimensional representation of the trajectory of the ball. Hawk-Eye is not infallible and is accurate to within 5 millimeters (0.19 inch) but is generally trusted as an impartial second opinion in sports. It has been accepted by governing bodies in tennis, cricket and association football as a technological means of adjudication. Hawk-Eye is used for the Challenge System since 2006 in tennis and Umpire Decision Review System in cricket since 2009. The major use in Cricket broadcasting is in analyzing Leg Before Wicket decisions, where the likely path of the ball can be projected forward, through the batsman's legs, to see if it would have hit the stumps. Consultation of the third umpire, for conventional slow motion or Hawk-Eye, on leg before wicket decisions, is currently sanctioned in international cricket even though doubts remain about its accuracy in cricket. The Hawk-eye referral for LBW decision is based on three criteria:

- Where the ball pitched
- The location of impact with the leg of the batsman
- The projected path of the ball past the batsman

In all three cases, marginal calls result in the on-field call being maintained.

1.1.1 Method of Operation

All Hawk-Eye systems are based on the principles of triangulation using the visual images and timing data provided by a number of high-speed video cameras located at different locations and angles around the area of play. For tennis there are ten cameras. The system rapidly processes the video feeds by a high-speed camera and ball tracker. A data store contains a predefined model of the playing area and includes data on the rules of the game. In each frame sent

from each camera, the system identifies the group of pixels which corresponds to the image of the ball. It then calculates for each frame the 3D position of the ball by comparing its position on at least two of the physically separate cameras at the same instant in time. A succession of frames builds up a record of the path along which the ball has travelled. It also "predicts" the future flight path of the ball and where it will interact with any of the playing area features already programmed into the database. The system can also interpret these interactions to decide infringements of the rules of the game.

1.2 Hot Spot

Hot Spot is an infra-red imaging system mainly used in Cricket to determine whether the ball has struck the batsman, bat or pad. Hot Spot requires two infra-red cameras on opposite sides of the ground above the field of play that are continuously recording an image. Any suspected snick or bat/ pad event can be verified by examining the infrared image, which usually shows a bright spot where contact friction from the ball has elevated the local temperature. Where referrals to an off-field third umpire are permitted, the technology is used to enhance the on-field umpire's decision-making accuracy. Where referrals are not permitted, the technology is used primarily as an analysis aid for televised coverage.

1.2.1 Method of Operation

Hot Spot uses two infra-red cameras positioned at either end of the ground. These cameras sense and measure heat from friction generated by a collision, such as ball on pad, ball on bat, ball on ground or ball on glove. Using a subtraction technique a series of black-and-white negative frames is generated into a computer, precisely localizing the ball's point of contact. In considering whether a batsman is out when the ball strikes bat then caught by a member of the fielding team or caught in front of the stumps when ball hits pad, one of the most difficult decisions is whether the ball struck the pad only, or the bat only, or (if it struck both) whether the pad or the bat was struck first. If the ball strikes the bat only, or strikes the bat followed by the pad, then the batsman could be out caught but not LBW. If the ball strikes the pad in front of the stumps or in line with stumps, then the batsman could be out LBW but not caught. If the ball strikes the pad followed by the bat, then the batsman could be out LBW or out caught if a fielder catches the ball. The batsman's bat and pad are often close together, and it can be very hard to determine by eye which was struck first, whereas the hotspot technology can often resolve the question. Hot-spot imagery is also used to show which part of the cricket bat hit the ball, as ideally the batsmen try to "middle" the ball i.e. hit it where the sweet spot lies. Hot spot camera provides some valuable information while analyzing the strokes played by a batsman. The technology was first used during the first Test match of the 2006-07 Ashes at The Gabba, on 23 November 2006. ICC announced that Hot Spot images would be available for use as part of its ongoing technology trial during the second and third Tests (March 2009) in South Africa.

1.3 Instant Replay

Instant replay is a video reproduction of something that recently occurred which was both shot and broadcast live. The video, having already been shown live, is replayed in order for viewers to see again and analyze what had just taken place. Some sports allow officiating calls to be overturned after the review of a play. Instant replay is most commonly used in sports, but is also used in other fields of live TV. first near-instant replay system was developed and used in Canada, the first instant replay was developed and deployed in the United States. In television broadcasting of sports events, instant replay is often used during live broadcast, to show a passage of play which was important or remarkable, or which was unclear on first sight. Replays are typically shown during a break or lull in the action; in modern telecasts, it will be the next break, though older systems were sometimes less instant. The replay may be in slow motion, or from multiple camera angles. Video servers, with their advanced technology, have allowed for more complex replays, such as freeze frame, frame-by-frame review, replay at variable speeds, overlaying of virtual graphics, instant analysis tools such as ball speed or immediate distance calculation. Sports commentators analyze the replay footage when it is being played, rather than describing the concurrent live action.

1.4 USE

Some sports organizations allow referees or other officials to consult replay footage before making or revising a decision about an unclear or dubious play. This is variously called video referee, video umpire, instant replay official, television match official or third umpire. Other organizations allow video evidence only after the end of the contest, for example to penalize a player for misconduct not noticed by the officials during play. Leagues using instant replay in official decision making include the National Hockey League, National Football League, Canadian Football League,

National Basketball Association, and Major League Baseball. The role of the video referee differs varies; often they can only be called upon to adjudicate on specific events. Due to the cost of television cameras and other equipment needed for a video referee to function, most sports only employ them at a professional or top-class level.

2. Conclusion

The use of technology in sports has certainly provided man with a useful tool to reduce human error and increase the total sports performance. Hawk-Eye is a complex computer system used officially in numerous sports such as Cricket, Tennis, Badminton, Curling, and Association Football, to visually track the trajectory of the ball and display a record of its statistically most likely path as a moving image. It has been accepted by governing bodies in tennis, cricket and association football as a technological means of adjudication. Hawk-Eye is used for the Challenge System since 2006 in tennis and Umpire Decision Review System in cricket since 2009. Hot Spot is an infra-red imaging system mainly used in Cricket to determine whether the ball has struck the batsman, bat or pad. Hot Spot requires two infra-red cameras on opposite sides of the ground above the field of play that are continuously recording an image. Any suspected snick or bat/ pad event can be verified by examining the infrared image, which usually shows a bright spot where contact friction from the ball has elevated the local temperature. Instant replay is a video reproduction of something that recently occurred which was both shot and broadcast live. The video, having already been shown live, is replayed in order for viewers to see again and analyze what had just taken place.

3. References

[1]. Starkey, J. (2003). Instant Replay born 40 years ago today. Tribune-Review (Pittsburgh). Dickinson, M. (2007). Hawk-Eye set to extend its influence to contested goals. The Sunday Times (London). Retrieved 29 June2010.
[2]. NINE unveils new 'HOT SPOT' cricket technology. Nine Network, 2006. Archived from the original on 2007-07-05. Retrieved 2007-07-26.
[3]. http://www.scribd.com/doc/84631898/Hawk-Eye-Technology-Ppt
[4]. http://www.Wikipedia.com/Hotspot.

Corresponding Author:
Kulbeer Singh,
Assistant Professor,
Malwa College of Physical Education,
Bathinda, Punjab, India.

© International Journal of Physical Education and Sports (IJPES)