



# Comparisons of Advanced Computing Technique used in Cricket Game

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## Abstract:

*Cricket is a Gentle man's Game. It is really very difficult for any one (umpire) to take decision in real time because the speed and movement of ball. For human, to take decision in real time when the bowler like shoiab akhtar and brett lee bowling at the speed of 150 plus KMPH. Even though the bowler like shane warne turns (spin) the at an angle of almost 45 to 60 degree. In cricketing world everything is happening so fast it would be impossible for anyone to make decision in time. Hence, cricket has adopted few technologies to make game easier for the umpires. There are many technologies used nowadays in cricket game. But in my Paper I am going to discussed few of them.*

*With easiness of game one must also have to discussed cost effectiveness, use of technology to its maximum effectiveness and easy for the implementation. In this research paper we are going to discussed various advantages and disadvantage of the each technology used in the cricket game now days. The paper also focused on advanced image processing, stored and compressed image algorithm as well as hardware devices are used to record the real time images from the cricketing field.*

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**Keywords:** *Image Processing, advanced Computing Techniques, hot spot, hawk eye, snick-o-meter*

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## 1. Introduction

The game of cricket has a realized history starting in the late sixteenth century. Having started in south-east England, it turned into the nation's national game in the eighteenth century and has grown internationally in the nineteenth and twentieth hundreds of years. Global matches have been played since 1844 and Test cricket started, reflectively perceived, in 1877. Cricket is the world's second most well known onlooker sport after affiliation football (soccer). Administration is by the International Cricket Council (ICC) which has more than one hundred nations and domains in enrollment albeit just twelve right now play Test cricket. With advent days there were many changes in the game occur. Right from history cricket played with red ball, white dresses and 5 days for the play that's known as Test match.

Then after one day comes with variations in the game finished in one day with full of excitement and romance. Later T20 came each side only 20 over to spare. The player also became so innovative in the shot selection and bowler also became wise to stop them. Throughout the years cricket has consolidated into the game a couple of the most recent innovative advances accessible. There have been a few dismissals of innovation, for example, the utilization of aluminum cricket bats, however for the most part the ICC have been appropriately mindful about making changes to the game that will affect the players and observers. Many technologies failed to fit in the game but few of them are so powerful that totally changes the game. In this paper following Technologies is going to discussed and compared.

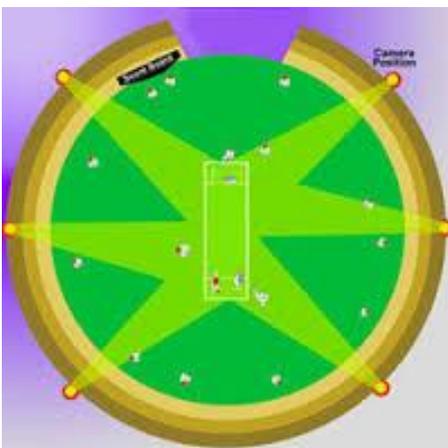
1. Decision Review System
2. Hawk eye
3. Snick-o-meter
4. Hot Spot
5. Ball Spin RPM
6. LED Lighting
7. Spider Cam
8. DRS (Decision Reviewed System)
9. Third Umpire

### ***1.1 Decision Review System***

Cricket has joined some other world sports and has included an umpire referral system in some international matches. Such a system was first trialed in 2008 (in a Test series between Sri Lanka and India). Unlike in tennis where the challenge and referral decision is clear cut using hawk-eye technology, the cricket referral is adjudicated by the third umpire, and is open to further errors. The actual way it works may change and develop, but when it was first brought in this is how it worked. Players are allowed to challenge decisions made by the on-field umpires, and have them referred to the TV official. For each innings of the Test, each team can challenge any decisions, though they will be limited to two unsuccessful challenges per innings. Only the batsman on the receiving end of the umpire's original decision or the captain of the fielding side can appeal by making a "T" sign with both forearms at shoulder height.

The third umpire uses the technology of the hot spot and slow motion replays at different angles to gain information and make decisions. It all sounds great for the players and viewers at home, but the pressure is on the umpires. In reality, the process often takes too long and can distract from the game. When there are challenges left near the end of an innings, players tend to make frivolous challenges on the off-chance of getting a decision overturned. So there are still problems that need to be ironed out, but the referral system is a great step forward for cricket.

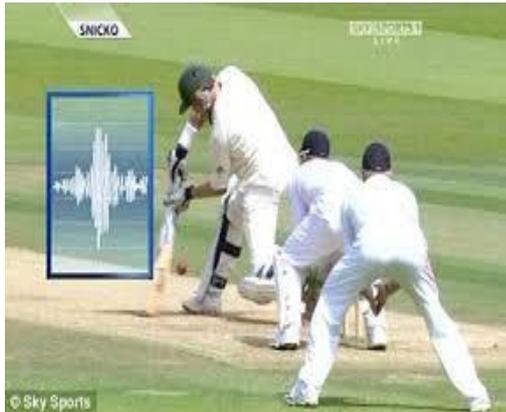
### ***1.2 Hawk eye***



Hawk-Eye uses six or more computer-linked television cameras situated around the cricket field of play. The computer reads in the video in real time, and tracks the path of the cricket ball on each camera. These six separate views are then combined together to produce an accurate 3D representation of the path of the ball. The Hawk-eye system was launched in 2001. It was first used in television coverage of sporting events such as Test cricket, and has now reached the stage of being used by officials in tennis to assist in adjudicating close line calls. The system was first used during a Test match between Pakistan and England at Lord's Cricket Ground, on 21 April 2001, in the TV coverage by Channel 4. Since then it has been an indispensable tool for cricket commentators around the world.

It is used primarily by the majority of television networks to track the trajectory of balls in flight, mostly for analyzing leg before wicket decisions. The ball by ball tracking by the Hawk -Eye system also allows the broadcasters to showcase many other features of the game, such as comparing the bowlers' speeds, spin, swing, line and length. In the case of LBW decisions, Hawk-Eye is able to project the likely path of the ball forward, through the batsman's legs, to see if it would have hit the wicket. In addition to providing information to TV viewers, the technology is also used by the third umpire to adjudicate on LBW decisions that have been referred.

### 1.3 Snick-o-meter



The Snick-o-meter (known as 'snick-o' for short) was invented by English Computer Scientist, Allan Plaskett, in the mid-1990s. Snick-o-meter technology was first used in 1999 by Channel 4 in the UK, before being used in India and Australia. The snick-o-meter is composed of a very sensitive microphone located in one of the stumps, connected to an oscilloscope that measures sound waves. When the ball nicks the bat, the oscilloscope trace will pick up the sounds. At the same time, a high speed camera records the ball passing the bat.

The oscilloscope trace is then shown alongside slow motion video of the ball passing the bat, and by the shape of the sound wave you can determine whether or not the noise picked up by the microphone coincides with the ball passing the bat, and whether the sound seems to come from the bat hitting the ball or from some other object. This technology is used in televised cricket matches to graphically show the video of the ball passing the bat at the same time the audio of any sounds at the time. It is only used to give the television audience more information and to show if the ball did or did not actually hit the bat. The umpires do not get the benefit of seeing 'snick-o'. As the ball passes the bat, there can be other noises that can be confused with the ball on bat noises. The bat often hits the pads on the way through, making a sound at the same time the ball passes the bat. The sound/sound wave is purportedly different for bat-pad and bat-ball, but this is not always clear. The shape of the recorded soundwave is the key - a short sharp sound is associated with bat on ball. The bat hitting the pads or the ground produces a flatter sound wave. Note that the umpire does not have the benefit of the snick-o-meter, and must instead rely on his senses of sight and hearing, as well as his own personal judgment.

### 1.4 Hot spot



The hot spot technology is mostly used to review whether the bat has hit the ball, particularly when there is a small nick. If there is contact, the small amount of heat generated is indicated by a change to that area of the bat. 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. Following some controversy after the

2012 UK Ashes series, there is doubt over the accuracy of Hot Spot.

### 1.5 Ball Spin RPM



Starting during the TV coverage by Sky sports for the 2013 Ashes series, they were able to show a RPM (revolutions per minute) counter, showing how fast the ball was spinning after release. It is not clear how this is measured, though it would need a high speed camera focused on the ball, possibly using the same images that are captured for the Hawkeye system.

### ***1.6 LED Lighting***

LED lights are placed in the stumps and the bails. When these are dislodged the lights will start to flash. This can be very useful if the bails are dislodged but the fall back into place. The lights can be clearly seen and so there will be no doubt whether the bails have been dislodged or not. This technology is used in a number of competitions such as the World T20 and the Indian Premier League. The lights can be clearly seen and so there will be no doubt whether the bails have been dislodged or not. This technology is used in a number of competitions such as the World T20 and the Indian Premier League.

### ***1.7 Spider Cam***

This technology is also used in a number of other sports. It is a system of wires that allows a camera to move both horizontally and vertically over the area of play. It can be used by television cameras so that they are able to broadcast every aspect of the match from the angle that shows the most action. It can also be used to help umpires look at the game play from a number of different angles so that they can be sure they are making the correct decision. It can be used by television cameras so that they are able to broadcast every aspect of the match from the angle that shows the most action. It can also be used to help umpires look at the game play from a number of different angles so that they can be sure they are making the correct decision.

### ***1.8 Umpire Decision Review System***

The Umpire Decision Review System (UDRS or DRS) is a technology-based system used in cricket to assist the match officials with their decision-making. On-field umpires may choose to consult with the third umpire (known as an Umpire Review), and players may request that the third umpire consider a decision of the on-field umpires (known as a Player Review). The main elements that have been used are television replays, technology that tracks the path of the ball and predicts what it would have done, microphones to detect small sounds made as the ball hits bat or pad, and infra-red imaging to detect temperature changes as the ball hits the bat or pad. While on-field Test match umpires have been able to refer some decisions to a third umpire since November 1992, the formal DRS system to add Player Reviews was first used in a Test match in 2008.

### ***1.9 Third Umpire***

The third umpire (or TV Umpire[1]) is an off-field umpire used in some cricket matches, particularly international matches. Their role is to make the final decision in questions referred to them by the two on-field umpires or the players. The third umpire is also there to act as an emergency on-field umpire if required. An on-field umpire can, at his own discretion, use a radio link to refer particular types of close decision to the third umpire, this is called an Umpire Review. When the full Umpire Decision Review System is not in use, the third umpire uses television replays (only) to assist him in coming to a decision. When the full DRS is in use, players can also initiate reviews of particular decisions by the on-field umpires, this is called a Player Review. These are judged by the third umpire, and the third umpire has the full range of technology available beyond simple replays, for both Umpire Reviews and Player Reviews.

## 2. Comparison

	<b>Hawk eye</b>	<b>Snick-o-meter</b>	<b>Hot Spot</b>
<b>Techniques</b>	6 camera plotted every corner of the ground captures real time image	Sound wave technology uses and processed by oscillators	Heat sensing techniques
<b>Cost effectiveness</b>	Very costly Around \$6000 per Match	Least costly Around \$2000 per Match	Medium Costly Around \$3000 per Match
<b>Reliability</b>	Accurate	Least	Medium
<b>Develop Year</b>	2001	1999	2012
<b>Which sport</b>	Tennis	Cricket	Cricket
<b>Where</b>	Wimbledon, England	Columbo, Srilanka	Australia
<b>First Cricket Match</b>	England V/s Pakistan	India V/s Srilanka	England V/s Australia Ashes
<b>Criticism</b>	Most	Highly accepted	Medium accepted Little doubt on technology

## 2. Conclusion and future scope

In this paper, various Advanced Computing Techniques used in cricketing world are going to be compared. It is found that some of the techniques are outclassing due to their lower efficiency and highly cost required to be installed, maintained and manipulated. The techniques name third umpire requires human intervention. It is not fully automated but less costly. Whereas the techniques like LED Lighting and Spider Cam requires the use of cable and many other electro mechanical connections. But, the techniques which fully fill the need of latest demand of cricket game is in the technology named hawk eye, snick-o-meter and hot spot. This technology serves the latest demand of cricketing game. For human impossible to recognize whether the batsman is out or not out in real time. Everything is happening so quickly human needs technological support.

Cricket is going to change every day, it may be possible in near future more advanced technology needed. The current technology may not be suitable to meet the future requirements. So, it is always necessary to do research on the existing technologies that were used in cricket game. Because of crowd expectation, the game of cricket is changing day to day. Hence, the technologies used in cricket are constantly evaluated and changed as per the time demands.

## References

1. "Archived copy" (PDF). Archived from the original (PDF) on 30 October 2012. Retrieved 19 September 2012.
2. "NINE unveils new 'HOT SPOT' cricket technology". Nine Network. 2006. Archived from the original on 5 July 2007. Retrieved 26 July 2007.
3. Bandura, A. (1986) Social foundations of thought and action: A social cognitive theory. EnglewoodCliffs, NJ: Prentice Hall
4. Beesley, S. and Mutrie, N. (1997) Exercise is beneficial adjunctive treatment in depression. BritishMedical Journal, 315, 1542
5. Biddle, S. J. H. (1997) Current trends in sport and exercise psychology research. The Psychologist:Bulletin of the British Psychological Society, 10(2), 63–9.
6. Biddle, S. J. H., Fox, K. R. and Edmunds, L. (1994) Physical activity promotion in primary health care in England. London: Health Education Authority

7. Brownson, R. C., D. A. Jones, M. Pratt, C. Blanton, and G.W. Heath. 2000. Measuring Physical Activity with the Behavioral Risk Factor Surveillance System. *Medicine and Science in Sports and Exercise*, Vol. 32, No. 11, pp. 1913–1918.
8. Cricinfo: ICC expands referral trials to include Hot Spot
9. CricketSafari.com: The Leading Cricket Safari Site on the Net
10. Fay, Steven (21 May 2000). "First the snickometer, now for the lbw detector". *The Independent*. Retrieved 17 June 2010.
11. <http://www.9perth.com.au/News/item126.aspx>
12. <http://www.leonardocompany.com/-/slx-hawk-1>
13. Kohli, Virat (14 September 2019). "Virat Kohli Cricket News". <https://www.scintillatingstars.com>. scintillating stars. Archived from the original on 14 September 2019. Retrieved 14 September 2019. External link in `|website=` (help)
14. Maume, Chris (1999-06-25). "Cricket: Channel 4 reveals the sensational Snickometer". *The Independent*. London. Retrieved 2010-05-23.
15. Media and Sport Committee Culture, Parliament, House of Commons (2006). Broadcasting Rights for Cricket: Ashes to Ashes - the Death Knell for Live Test Match Cricket on Free-to-air TV?; First Report of Session 2005-06; Report, Together with Formal Minutes, Oral and Written Evidence. The Stationery Office. ISBN 978-0-215-02723-8.
16. New Invention in cricket broadcasting – "Hot Spot". -> Itsonlycricket, is only cricket!
17. Technology in cricket : Technology in cricket: New cameras should capture faintest of edges, says Hot Spot inventor | Cricket News | Global | ESPN Cricinfo
18. William Buckland (2008). *Pommies*. Troubador Publishing Ltd. p. 162. ISBN 978-1-906510-32-9.