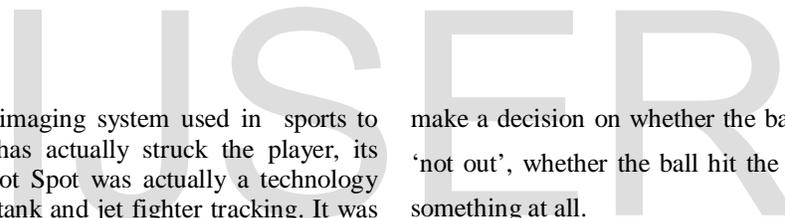


“Improvement in Hot Spot Technology in Cricket” Technique for the Best

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Abstract :- Hot spot technology is an infra-red imaging system which is most popularly used in sports especially in cricket to determine whether the ball has actually struck the player or his equipments or even the ground. Hot spot was actually a technology developed in the military for tank and jet fighter detection. It was widely used in war prone areas for tracking of various military equipments. The device, known as 'hotspot', could show whether a batsman was out or not with 85% accuracy. To Increase the Capacity of Hotspot Technique Upto 99.5% We decrease in this Paper. It is a scientifically proven piece of technology that will end all speculation surrounding a dismissal. Hotspot technology uses two infra-red cameras which are positioned at either end of ground above the field of play that are continuously recording an image that show the miniscule amount of heat generated from friction when two objects collide. On any snick or bat pad event occurring the infra-red camera sends images to the computer which then turns it into a negative image showing us the outcome of the recent incident. This negative image is produced a technique known as subtraction technique. The image shows a hot spot on the area where there is collision giving us an accurate conclusion on the decision. Hotspot technology is also used in games like snooker and tennis. The main drawbacks in using this technique are the cost of implementing this technique in high. Also it affects the game speed. This technology is now being used on trial basis in cricket and it is proving to be successful. It is already of tennis and snooker. Also it is having a number of uses in military as well.

Keywords :- Cricket, Hotspot, Snickometer, Bat & Ball.



INTRODUCTION :-

Hot Spot is an infra-red imaging system used in sports to determine whether the ball has actually struck the player, its equipments or the ground. Hot Spot was actually a technology developed in the military for tank and jet fighter tracking. It was widely used in war prone areas for the tracking of various military equipments.

The technology was adapted for television by BBG Sports, the Australian company responsible for the Snickometer, in conjunction with Sports. The technology was first used by the Australian Nine Network during the first Test match of the 2006-07 Ashes at The Gabba, on 23 November 2006.

The ICC has announced that Hot Spot images will be available for use as part of its ongoing technology trial during the second and third Tests (March 2009) in South Africa. The system will be available to the third umpire in the event of a player referral. The Hot Spot technology was in fact founded by French scientist Nicholas Bion, before being worked upon by a many different companies in Paris and been bought and adopted by the Nine Network Australia. The technological drive for smaller devices using less power with greater functionality has created new potential applications in the sensor and data acquisition sectors.

The image shows us any heat been produced in the field of play, giving us a 85% accurate conclusion on the decision. To Increase the Capacity of Hotspot Technique upto 99.5% We decrease in this Paper. The main aim of this technology is to successfully

make a decision on whether the batsman is dismissed or granted 'not out', whether the ball hit the bat, pad or glove and if it hit something at all.

Standard Definition :- “Hot Spot is a ball tracking technology used in television relies on infrared cameras that detect the heat signature of ball impact.”

Uses Of Hot Spot :- This technology can be used to finds

- i) The correct LBW decision, so that any edge from the bat can be easily detected with the help of this technology.
- ii) When it comes to any keeper catch even the slight edge or nick can also be detected with the help of this technology.

In recent years of cricket one of the major problem in cricket is the umpire's decision and if this umpire's decision goes wrong in the case of any main batsman who is crucial for the team to win the match. This has happened many times and that too these LBW decisions.

Well this Hotspot technology is most often used in two important cases,

i) Caught behind- Did the batsman Nick the ball?

Well, the image below is good enough to explain the given

situation. Well when we consider this in ordinary images or videos, we might feel that the batsman must have nick it and with the deviation produced, the umpire would have given out and as a result of that the batsman would be the unluckiest man. But with the use of this technology we can help the batsman in knowing the truth that the ball had struck the pad and not the bat, with the help of the white spot which is produced on the pad.

Another issue which can be discussed from the image from the viewers point is that the question of LBW, if the umpire had the idea of giving him LBW. And any cricket fan can easily guess with the help of this hot spot that the ball misses the off stump. And so this technology of hotspot made the job of umpire easier and in fact in future this can also be a danger for umpire, as they can replace them, which results in losing their job.



Caught Behind



The above image is a evidence to prove that a batsman is out LBW or not. The image is clear enough that the batsman didn't have any inside image as there is no white spot in the bat, rather the white spot is found in the pads and it is very clear that the batsman is out LBW.

But this is given out most of the time LBW and the confusion arises when the umpires gives any batsman out LBW without knowing that, there was an inside edge. So all these controversies can be overcome with the help of these hotspot technologies

Umpires vs Hotspot :- Most often, the biggest mistake that the umpire commit is in these LBW decisions and that too many batsmen where given out LBW, in spite of the inside edge and we should not blame umpires for this, because they are also humans "to err is human"..... So the main purpose why this technology was invented is to find whether the batsman has edge it or the ball has struck directly on the pad. This determination is enough to find whether a batsman is out or not, in the case of caught behind and LBW decision.

Well the introduction of this technology is not an ordinary step, because earlier this technology was used in the military to by the tanks and also by the jets so that they could trace any of their enemies, and these was used particularly in countries like Australia.

Those who watch cricket regularly might have known which country started using this technology first. It is Australia and we might have seen these technology were used during the Ashes when England team travelled Australia and also during the Indian matches that were played in Australia.

But now this technology is used in every country and it was also accepted as the best technology as it gives the accurate decision, which was not in the case of Hawk Eye, which was used for LBW decision, and that too the hotspot technology used for finding caught behind, in the case of any slight edge, and in the LBW decision, whether to find the ball has struck directly on the pad of it has any inside edge, are very accurate.

This technology was first used in the 2006-2007 Ashes series on 23rd November 2006 at the Gabba, Brisbane cricket stadium by the Australian Nine network. Moreover this technology was first adapted for television by the BBG Sports,

which is an Australian company who earlier introduced the technology called Snickometer, in conjunction with Sky Sports.

use the IR cameras we could easily detect this.

Know their technology -How Hot Spot is used?

When it comes to this technology we need the following requirements to ensure this technology is available

- i) The TV broadcasting channel who is involved in the Live telecasting of the matches, uses many cameras in the ground so that they could get the different angles. They must also spend money to use two infra red cameras on the ground.
- ii) These two infra red cameras are used at the either side of the ground, i.e. where they have the side screen, so that they could clearly have the view of the batsmen when he faces the ball. The reason why we need to use 2 cameras at the either side is that in cricket, after every over it is the keeper who changes the side and so after each over the bowler will bowl from different end.

After installing the cameras, the hot spot images can be used whenever any controversial decision was made and we can get the accurate decision with the help of these hot spot images and especially for the LBW and when the batsman snick the ball. Well, the working of this technology can be very easily understood. Whenever the batsmen is in contact with the ball, then the IR cameras which are set on the either side of the ground will send these images to the computer and in the next process all these images are converted into a negative image. Now the IR cameras which are fixed on the either side has a great function, because they have the capability to sense and measure any heat produced due to the friction generated by a collision, which includes

- i) Meeting of the ball to the bat
- ii) When the ball strikes the pad or any other parts of the body. So when these images are processed into negative images and in case if the ball has struck the pad, the we can see a white spot in those images, which are resulted due to the heat produced when the pad and ball meets.



The image is represented using a 3*4 pixel frame. The pixel values just before the slap is shown in table 2.1 and the pixel values of the frame at the time of slap is shown in table 2.2 . The pixel values in table 2.1 are due to the body temperature and the values in table 2.2 is due to rise in body temperature as a result of slap.

12	13	12	12
14	12	11	12
12	12	12	12

Table 1

13	15	15	16
13	140	14	15
15	16	16	16

Table 2

The pixel with the intensity value 140 is the pixel in which the slap has occurred.

The brightest (warmest) parts of the image are customarily colored white, intermediate temperatures reds and yellows, and the dimmest (coolest) parts blue.

Practical Examples

In simple way we can express while consider two examples,

- i) Whenever we slap a person, we are applying some force and then we strike them and at this instant the heat is produced due the friction that occurs between the face and hands and if we

DrawBack of Hot Spot:- Basically Hot Spot is works on the sound of the Bat and Ball Struck. Sometime Sound may Produce by Air Also

Wrong Decisions Given due to Hot Spot :-

In the India-England ODI Series in 2011, there were controversial decisions based on the Hot Spot technology going against India's Rahul Dravid on more than one occasion where Hot Spot replays proved inconclusive and yet Dravid was given out. On one occasion, there seemed to be a nick which Hot Spot wasn't able to detect. These incidents threw the role of Hot Spot technology into doubt once again.

In the 2013 Ashes, many decisions again cast doubts on Hotspot Technology.

Improvement in Hot Spot Technology :- To Improvement of this Technology , I was think that , a 360 Degree Camera Fit on the Middle of the Cricket Ball. Now, When the ball will struck on the bat than we will get the Real Picture of that Moment. So we Improve our decisions.

How it Works :- A Wi-fi Camera of 360 Degree Connected with Grounded Camera's Fit on the middle of the Cricket Ball. Now, When the ball will struck on the bat or not. we will get the Real Picture of that Moment.

Advantage after Improvement :-

- 1) Correct Decisions May Increase up to 9 to 10%.
- 2) Real Picture of that Moment make Easy to take a Decision by Third Umpire.
- 3) It takes less time.
- 4) Ball Tempering is impossible.
- 5) Catch taken by Kipper or Fielder is seen cereal by camera fixed on ball.

Future Enhancement :- Hotspot is one of the most accepted and accurate technology which is used at present in most of the cricket matches. In spite of accuracy used in this technology, ICC

hasn't made this technology to be used officially. This technology is used in every country and it was also accepted as the best technology as it gives the accurate decision, which was not in the case of Hawk Eye, which was used for LBW decision, and that too the hotspot technology used for finding caught behind, in the case of any slight edge, and in the LBW decision, whether to find the ball has struck directly on the pad of it has any inside edge, are very accurate.

This technology is likely to be used in the upcoming ICC cricket world cup. Hotspot technology is having the backing of science to get 100% accurate conclusion on a decision. There are two main issues in implementing this technology. One is the cost in implementing this technology and other is it actually slows the speed of the game. So there should be rules for asking hotspot referrals so that the game speed doesn't get compromised. The challenge is to ensure the pace of the game is maintained and also it remains a fair deal.

Conclusions :- Hotspot is one of the most accepted and accurate technology which is used at present in most of the cricket matches. In spite of accuracy used in this technology, ICC hasn't made this technology to be used officially. With the use of this technology we can help the batsman in knowing the truth that the ball had stuck the pad and not the bat, with the help of the white spot which is produced on the pad. This technology of hotspot made the job of umpire easier and in fact in future this can also be a danger for umpire, as they can replace them, which results in losing their job. Anyone can easily guess with the help of this hot spot that the ball misses the off stump.

Hotspot has a particular advantage over its competing technology, the Snickometer , which is a sound-detection based system. Snickometer often produces inconclusive results indicating contact (potentially any combination of bat,

pad and ball) only, whereas the Hot Spot clearly shows exactly what the ball strikes.

Hotspot technology, even though it is extremely accurate, is not used in many matches. The main reason for this is its expense: \$6000 per day for the use of two cameras and \$10000 for the use of four cameras. Thus, some less wealthy countries do not use the technology so as to conserve money. Usage of hotspot technology in cricket also cost time. So there should be rules for asking hotspot referrals so that the game speed doesn't get compromised. The challenge is to ensure the pace of the game is maintained and also it remains a fair deal.

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