www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume 2 Issue 5 May, 2013 Page No. 1626-1629

REVIEW ON TECHNOLOGY TO MEASURE SPEED OF CRICKET BALL AND BAT

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ABSRTACT:
Today, Cricket is a very popular game worldwide. Cricket is a bat and ball game played between two teams of 11 players on a roughly circular field. It involves a bowler, a batsman and fielders. The bowler bowls to the batsman and tries to get him out while the batsman tries to score and hitting a ball. In cricket two factors are too much important and these factors are hitting speed & bowling speed. In this paper we look at various techniques that have been used to propose in recent years to measures the speed of bat and ball in cricket. This paper gives introduction about cricket in section 1. Section 2 tells the various methods suggested to measure speed in cricket. Finally section 3 concludes the paper.

Keywords: Cricket; hitting a ball; bowling speed; hitting speed;

1. INTRODUCTION:

In a cricket bowler bowl a ball and batsman tries to hit a ball. We have two teams in cricket. One team's two player batting and tries to got more score. Second team's singe player attempt bowling and other player fields the ball attempting to restrict the scoring and dismiss the batsmen. The main objective of game is score more runs than its opponent. Sometime it may be possible that dismiss more player of opponent team .If score of both teams are equal than match will be drawn. In cricket we have two types of extra balls that are "No ball & wide ball". No ball is such ball when bowler breaks the rules of bowling like using inappropriate arm action, overstepping the popping crease, touch the crease by his foot. Wide ball is such a ball when bowler bowls such ball that is out the reach of batsman. A wide must be re-bowled. If a wide ball crosses the boundary, five runs are awarded to the batting side.[15]

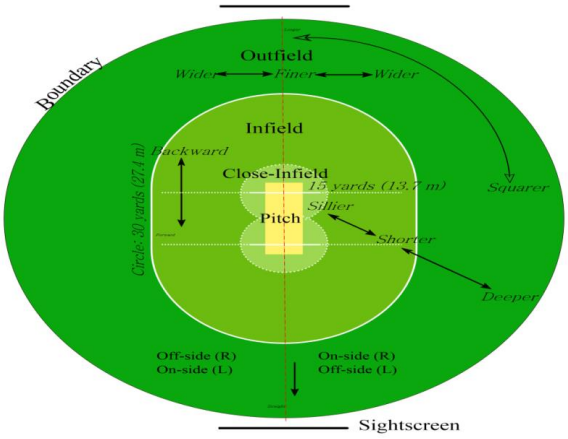

Figure 1.1 A typical cricket field.

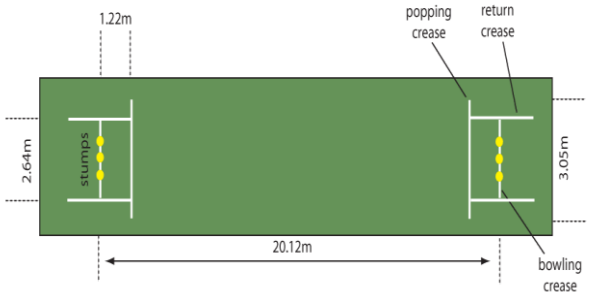

Figure 1.2 The cricket pitch dimensions

Speed is described as the "rate of motion or progress" or the time taken to cover a certain distance and is usually related to linear (straight line) movement whereas agility is defined as "the power to move quickly and easily, nimbleness" and is describes the ability to change direction quickly and effectively. so we can say that speed is necessary to measure. Important parameters are bowler's balling speed, hitting speed, speed of ball after touch the bat and distance cover by the ball.[15] Over the years various methods have been devised to measure the above parameters. Section 2 gives a brief overview of those methods.

2. REALATED WORK:

By studying the related literature it was concluded that limited research has been carried out on the game of cricket. Bowling is an essential part of cricket, bringing the ball into play, often at great speed. The world's fastest bowlers regularly produce deliveries traveling at over 95 mph. The most common methods used to measure the speed of cricket ball are:

2.1 Radar Gun:

Radar guns measure the speed of a cricket ball in much the same way as they measure the speed of a moving car. A radar gun includes both a radio transmitter and a receiver. It sends out a concentrated radio wave which is reflected off any object in its path -- in this case the cricket ball. The gun receives this "echo" and uses the Doppler shift principle to calculate the speed of the moving object.[16]

2.2 Hawk Eye:

Hawk Eye technology also measures the speed of a cricket ball as it is bowled Hawk Eye takes data from six cameras. It uses this data to track the path of the ball from the time it leaves the bowler's hand to the time it goes dead, and presents this information as a three-dimensional image.[16]

Various other methods that are proposed by the researchers are:

2.3 Using Genetic algorithm:-

In Cricket, bowling in the right areas has always been a headache for the bowlers and the coaches alike, not because bowlers are not accurate enough, but because the 'right areas' vary greatly according to the weather, pitch conditions, field placing, ball condition etc .Genetic Algorithms help the bowler in selecting the right areas to bowl to a particular batsman hence solving this rather difficult coaching problem in a straightforward manner. In this method dots represent the location where the ball will be throwing. By looking at these dots the bowler has sprayed the ball all over the place and must have gone for quite a few runs. The model of the batsman in this case is one who is weak at handling good length deliveries, strong at full length deliveries and neutral with short length deliveries, based on the runs scored at each ball.[4]

2.4 Triaxial accelometer sensor:

A bat swing includes the spatio-temporal position of the bat before contact with the ball and the bat velocity. The current methods of bat swing analysis such as video tracking and coach observation are labor intensive and expensive but Triaxial accelometer sensor method is low-cost, three dimensional motion sensors as a replacement to existing methods. It used two bat-mounted accelerometer sensors, and two experiments were conducted: a set of ball-free, straight drives at nominal constant speed, and a set of straight drives at different speeds by the same batter accompanied by video tracking. In all cases the bat swing was in the x-z plane of the sensors placed on the reverse face of the bat. The bat face remains in the z direction. The objective was to minimize accelerations perpendicular to the swing plane. The inertial sensor used is capable of measuring acceleration of ± 6g in three dimensional space. Two sensors were attached to the middle part of the back of the bat's blade length. Data were recorded in S1 and S2 accelerometer as *ax1*, *ay1*, *az1* along S1 axes (XS1, YS1, ZS1 respectively) and *ax2*, *ay2*, *az2* along S2 axes (XS2, YS2, ZS2 respectively) during straight ball-free bat swings in ZX-plane. The straight bat tapping on the ground was used to synchronize the timing between the video and sensor data. A video camera was placed at a

height of 1.4 m from the ground and 5 m lateral from the batting arc to make full trajectory of the bat swing visible.[1]

2.5 **Detection of throwing in cricket using wearable sensors**:

One of the great controversies of the modern game of cricket is the determination of whether a bowler is using an illegal throw-like bowling action. Changes to the rules of cricket have reduced some of the confusion. Monitoring the bowling arm during the bowling action involved primary and secondary identification phases. The three primary phases directly related to bowling action were:

- detecting the start of the arm action;
- detecting ball release;
- elbow angle detection between the start and end of the arm action.

The method uses inertial sensors on the upper and lower arms that do not impede the bowling action. To meet the requirements of the existing bowling law, the sensors would need to extract the change in angle between the two-arm sections about the elbow axis. Using a mapping of a database of legal and illegal deliveries to correlate to existing measures would be the preferred method. Direct extraction of elbow angle using rigid-body analysis techniques is confounded by the FA, which has multiple degrees of freedom through the often-unique anthropometry of bowlers and where inertial sensor common-mode rejection methods are inappropriate. The technology is an important step in the monitoring of bowling action on-field in near real-time. The technology is suitable for use in competition as well as a training tool for developing athletes.[17]

2.6 **Cricket Bat Acceleration Profile:**

A point where the ball receives maximum acceleration in cricket is known as sweet spot. In this using 3 axis accelerometers placed on the bat and the wrists. When ball strikes with bat it was recorded. For the first experiment accelerometer placed in hand held bat to show normal batting positions at the middle, bottom and top. In the second experiment acceleration placed in wrists and hand held bat. It tells us hits that thrown ball using a defensive stroke. All ball-contacts were assessed and written down by an independent observer, with the drives captured by a video camera positioned 1.4 m from the ground. The video record was used to confirm the ball-contact location. So both experiments were undertaken to identify the accelerometer profiles for sweet spot hits on a cricket bat. The contact location of the ball on the bat was identified using tape, video and subject assessment methods.[18]

3. CONCLUSION AND FUTURE SCOPE:

The current methods used in cricket to measure the speed have been doubted on accuracy. New technology sensors should be included in game cricket to measure speed more accurately. The technology is suitable for use in competition as well as a training tool for developing athletes. Work can be done to implement the sensor on the sides of boundary to calculate speed of ball. It's also helpful to us to justify and get true results regarding the wide ball and no ball. So we do not require video replay method and umpire decision. Also we will use sensors to detect the bowling action like No ball and wide ball.

REFERENCES

[1]Ajay K.Sarkar,Daniel A.James,Andrew W.Buesh,David V. Thiel, "Triaxial accelometer sensor trials for bat swing interpretaion in cricket",*APCST*,2011.

[2] Stretch, RA, Bartlett, R, Davids, K. "A review of batting in men's cricket", *Journal of Sports Sciences* 2000; 18: 931-49

[3] Mann, DL, Ho, NY, Souza, NJD, Watson, DR, Taylor SJ. " Is optimal vision required for the successful execution of an interceptive task?" *Human Movement Science* 2007; 26: 343-56.

[4] Hasham Shiraz Ali, Umar Nauman, Faraz Ahsan, Sajjad Mohsin, "Genetic Algorithm Based Bowling Coach For Cricket" Journal of Theoretical and Applied Information Technology 31st March 2012. Vol. 37 No.2.

[5] D. Terry, "The Seventeenth Century Game of Cricket: A Reconstruction of the Game",Journal of Sports History

[6] Hue, C., J.P. Le Cadre, and P. Perez, "Tracking multiple objects with particle filtering", *Technical Report, IRISA*,(2000).

[7] Sidenbladh, H. and S. Wirkander, "Tracking random sets of vehicles in terrain", *IEEE Workshop on Multi-Object Tracking, Madison, WI*, (2003).

[8]R. Porter*, A. Fraser, R. Loveland, E. Rosten, "A recurrent velocity filter for detecting large numbers of moving objects" *Los Alamos National Laboratory, Los Alamos, NM, USA* 87545

[9] Nissanka B. Priyantha, Hari Balakrishnan, Erik Demaine, and Seth Teller, *"*Anchor Free Distributed Localization in Sensor Networks*" MIT Laboratory for Computer Science*, 2008

[10] R. Porter*, A. Fraser, R. Loveland, E. Rosten, "*A recurrent velocity filter for detecting large numbers of moving objects*" Los Alamos National Laboratory, Los Alamos, NM, USA 87545

[11] Fleisig, GS, Zheng, N, Stodden, DF, Andrews JR. "Relationship between bat mass properties and bat velocity". *Sports Engineering* 2002; 5: 1–8.

[12] Koenig, K, Mitchell, ND, Hannigan, TE, Clutter, JK. "The influence of moment of inertia on baseball/softball bat swing speed",*Sports Engineering* 2004; 7: 105-17.

[13] Busch, A, James, D. " Analysis of cricket shots using inertial sensors",*The Impact of Technology on Sport II*. London: Taylor & Francis; 2008, p. 317-22

[14] Davey, N, Wixted, A, Ohji, Y, James, D. A modular integrated platform for microsensor applications. In: Fuss FK, Subic A,
Ujihashi A, editor. *The Impact of Technology on Sport II*. London: Taylor & Francis; 2008, p. 101-11

[15] Wikipedia Website. What is Cricket. http://en.wikipedia.org/wiki/Cricket

[16] Bowling speed measured website, http://www.ehow.com/facts_6950464_bowling-speed-measured-cricket_.html

[17] Spratford, Wayne; James, Daniel Arthur; Portus, Marc; Wixted, Andrew James, "Detection of throwing in cricket using wearable sensors", Taylor & Francis,2012

[18] Ajay K. Sarkara, Daniel A.Jamesa,b, Andrew W. Buscha, David V. Thiel,
"Cricket Bat Acceleration Profile from Sweet-Spot Impacts", 9th Conference of the International Sports Engineering Association (ISEA)