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A Study on Assessing Flying Sprint Performance of Sprinters using Newly Designed Electronic Device

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Abstract: ***This is a contemporary world and every field was automated by the support of electronic devices, these are excessive precise and constant to bring out the effort successfully. The present investigator made an attempt to create an electronic device to assess the flying sprint (Maintenance of maximum speed) performance of athletes in sprinting event. Presently flying sprint timings are not assessing in most of sprint event like district, divisional and state level programs due to lack of appropriate equipment. The prevailing influence of flying sprint performance is high on the result of every sprinting event. The investigator has designed an electronic device to find out accurate flying sprint performance of sprinters using the following core parts1.Microphone 2.Infrared Transmitters, 3.Infrared Receivers4.Interfacing Unit and Computer. To attain scientific authenticity of the gadget 120 subjects were chosen from Hindusthan College of Engineering and Technology, Coimbatore and the appropriate data were collected using the newly invented equipment while the subjects were running in the 100m race. The collected data were treated with appropriate statistical techniques and obtained Reliability, Validity and objectivity of the device.***

Keywords: Microphone, Infrared Transmitters, Infrared Receivers, Interfacing Unit, Computer, Reliability, Validity, objectivity and flying sprint.

1. Introduction

Scientific discoveries and related learning persist enhancing the modern world as incomparable proportions in every day. While all the fields gain the benefit of the scientific consent, the investigator educated to execute such innovations in the field of athletics. This raw thinking motivated him; consequently this device was invented to assess the flying sprint performance of athletes in sprinting events.

Currently the performance of athletes are assessing by manually operated stop watches, which may not be very perfect, because stop watches are operated by human beings; so the timings will based on the operating ability of the timer. Hence an Electronic device was invented with accurate starting and finishing technique. So we can find out perfect assessment of the sprinter.

1.1 Statement of the problem

The purpose of the study was to construct an Electronic device to arrive the flying sprint timings of all eight sprinters in sprinting events.

1.2 Delimitations

The Study was delimited in these following factors.

An instrument was constructed as per the requirement of obtaining flying sprint time (Split Time) ofsprinting events. 120 subjects were used to establish reliability, validityandObjectivity of the instrument.

1.3 Limitations

Below cited uncontrollable factors associated with this study accounted as limitations,

1) The quantum of physical life, Style, Physiological stress and reaction time, acceleration ability of the athletes were considered as limitations.
2) The unmanageable changes in climatic conditions and other meteorological factors during the period of testing and their manipulations on the experimental were considered as limitations.

1.4 Hypothesis

It was hypothesized that the invented electronic device will be valid, reliable and objective in assessing the flying sprint performance of the sprinters in selected sprinting events.

1.5 Significance of the study

1) This study gives additional information to the area of research.
2) The results of the study would be useful to coaches and administrators to assess the flying sprint performance of sprinters more accurately.
3) This study will help the participants to know their accurate flying sprint performance.

2. Methodology

2.1 Details about the Electronic Device

The following are the coreparts of Electronic Device.

1) IR Transmitter
2) IR Receiver
3) Interfacing Unit
4) Computer

IR Transmitters

The Infra-red transmitter having two different kinds of IC 555, As soon as power fed, they are producing Infra-Red rays and it emitting through the infrared Light Emitting Diode (LED) continuously towards IR receiver in a straight line.

IR Receivers

The IR receivers are having TSO P17 series IC, which receive the IR rays from the transmitters continuously. Since

the transmitters at various lanes are directly focused towards the receivers in straight line to receive the IR signal. The IR receivers converting the received IR rays into data signals and sends it to the interfacing unit.

Interfacing unit
This is the intelligence and vital part of the equipment. This unit contains a special micro controller which is programmed with appropriate timers. Whenever the IR receiver gets interruption special signals passed to this micro controller and it encodes the timers. This encoded signals converted as data signals and sending it to the computer which decodes the signals and displays the performance by timings.

Computer
This is a normal computer, which was installed with special software according to our programme. The computers receive the data signal from interfacing unit and it encoded by the software and displays the exact flying sprint performance timings of every athlete with precision.

3. Functioning Method

Assessing the Flying Sprint performance of sprinters
The IR transmitters and receivers were placed at the starting point, 20mts, 40mts, 60mts and 80mts and 100mtsofevery lane of 100mts track to find out split timings. The output of the each and every IR receivers was connected with interfacing unit.

When we fed the appropriate power to the IRmodules, the IR transmitters emits IR rays towards the corresponding IR receivers placed over the IR transmitters. The IR receiver directed the signals getting from IR transmitters to the Interfacing unit. Thus the data signals were encoded by interfacing unit and sent it to the computer for appropriate function.

When the starting gun was fired to commence the sprint, the athletes were started the race simultaneously all the eight timers in the computer were started by operating switch on operation. Consequently all 8 timers get operated simultaneously and flashed in the computer screen.

During the race, while the athletes crossing the starting point, 20mts,40mts, 60mts and 80mts, the continuously emitting IR rays getting interruption; this interruption is sensed by the corresponding IR receiver and sending it to the interfacing unit. The micro controller of the interfacing unit decodes the interruptions with the corresponding timer. The computer displayed the exact flying sprint timings of the every athlete.

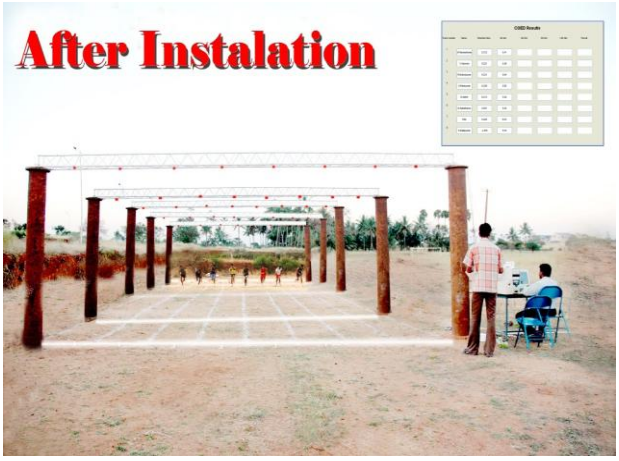

Figure 1: Assessing method of flying sprint Timings of all athletes

4. Results and Discussions

Computation of descriptive statistics

Testing Period	Mode of Assessment	Mean & SD	Speed Performance	
			20mts to 40m	40m to 80m
1	New Device	Mean	3.22	2.30
		SD	0.11	0.29
	Stop Watches	Mean	3.26	2.33
		SD	0.13	0.28
2	New Device	Mean	3.23	2.28
		SD	0.12	0.29
3	New Device	Mean	3.25	2.32
		SD	0.14	0.29

Table above shows the mean values of 40mts and 80mts phases of sprinters. The mean values of the subjects' 40m split timings between, 20mts to 40m during testing periods 1 to 3 are 3.22, 3.26, 3.23and 3.25 with standard deviations of ± 0.11, 0.13, 0.12 and 0.14 respectively. The mean values of the subjects' split timings between 40m to 80m during testing periods 1 to 3 are 2.30, 2.33, 2.28 and 2.32 with standard deviations of ± 0.29, 0.28, 0.29 and 0.29 respectively.

Reliability of 20mts to 40m split time analysis of variance with repeated measures for 20mts to 40m split time (sec.) sprint performance

Source	SS	df	MS	F
Subjects	18.847	119	0.158	
Trials	0.006	1	0.006	**0.85**
Residual	0.810	119	0.006	

The table value required for significance at 0.01 level of confidence with degrees of freedom 1& 119 is 4.78. The above table specifies that the obtained F ratio 0.85 is less than the table value of 4.78 required at 0.01 level of significant. This showed that there is no significant difference between the test and re-test scorers signifying that the process of testing of the 20mts to40mts split time is perfect and consistent.

Source	SS	df	MS_E	R
Subjects	18.847	119		
Trials	0.006	1	.006	0.95
Residual	0.810	119		

The table value required for significance at 0.01 level of confidence with degrees of freedom1&119 is 0.234.

Hence intraclass correlation was obtained for 20mts to 40mts split time, which indicates that the obtained intraclass (R) value 0.95 is higher than the table value 0.234 required at 0.01 level of significant. It denotes that the 20mts to 40mts split time assessed by the device during the test and re-test are significantly related.

The above results proved that the newly constructed electronic device is reliable to assess the 20mts to 40mts split of sprinters.

Reliability of split time from 40m to 80m
Analysis of variance with repeated measures
For split time from (sec.) Sprint performance

Source	SS	df	MS	F
Subjects	9.55	119	0.080	1.57
Trials	0.011	1	0.011	
Residual	0.912	119	0.007	

The table value required for significance at 0.01 level of confidence with degrees of freedom 1& 119 is 4.78.

Table indicates that the obtained F ratio 1.57 is less than the table value of 4.78 required at 0.01 level of significant. This proved that there is no significant difference between the test and re-test scorers indicating that the process of testing of split time from 40m to 80m is perfect and consistent.

Intraclass correlation for split time from 40m to 80m (sec.)

Source	SS	df	MS_E	R
Subjects	9.55	119	0.008	0.91
Trials	0.011	1		
Residual	0.912	119		

The table value required for significance at 0.01 level of confidence with degrees of freedom 1&119 is 0.234.

Table indicates that the obtained intraclass correlation (R) value 0.91 is higher than the table value 0.234 required at 0.01 level of significant. It denotes that the split timings from 40m to 80m recorded by the device during testing and re-testing periods are significantly related.

The above results proved that the newly constructed electronic device is reliable to assess the split timings from 40m to 80m of sprinters.

Validity of split time

Pearson product moment correlation for split time from 20mts to 40m (sec.)

Mode of Assessment	Mean	SD	r
New Device	2.21	0.28	0.90
Stopwatch	2.23	0.31	

The table value required for 2 & 118 degrees of freedom at 0.01 level of Significant is 0.236

Table indicates that the obtained correlation value 0.90 is higher than the table value 0.236 required at 0.01 level of significant. It denotes that the split timings from 20mts to 40mby using the newly invented electronic device and stopwatches simultaniouslyare significantly related.

Validity of split time from 40m to 80m

Pearson product moment correlation for split time from 40m to 80m (sec.)

Mode of Assessment	Mean	SD	r
New Device	2.13	0.29	0.93
Stopwatch	2.36	0.31	

The table value required for 2 & 118 degrees of freedom at 0.01 level of significant is 0.236

The table indicates that the obtained correlation value 0.93 is higher than the table value 0.236 required at 0.01 level of significant. It denotes that the split timings from 40m to 80m using the newly constructed electronic device and stopwatches simultaniouslyare significantly related.

The above results proved that the newly constructed electronic device is valid in assessing the split timings from starting point to 40mts and40mts to 80mts of sprinters on the track simultaneously for eight athletes.

Objectivity 20mts to 40m split time

Analysis of variance with repeated measures

For 20mts to 40m split Time (sec.)

Source	SS	df	MS	F
Subjects	30.22	119	0.25	**1.33**
Trials	0.007	2	0.004	
Residual	2.030	238	0.003	

The table value required for significant at 0.01 level of confidence with degrees of freedom1&119 is 4.78.

The table indicates that the obtained F ratio 1.33 is less than the table value of 4.78 required at 0.01 level of significant. This proved that there is no significant difference among three different testers. It reveals that, the process of testing the split time from 20mts to 40m is perfect and consistent.

Intraclass correlation for split time from Starting point to 20m (sec.)

Source	SS	df	MS_E	R
Subjects	30.22	119	0.012	0.82
Trials	0.007	2		
Residual	2.030	238		

The table value required for significant at 0.01 level of confidence with degrees of freedom 1&119 is 0.234.

The above table indicates that the obtained intraclass (R) value 0.82 is higher than the table value 0.234 required at 0.01 level of significant. It denotes that the split time from 20mts to 40m recorded by the three testers using the newly constructed electronic device at three different periodsare significantly related.

Objectivity of Split Time from 40m to 80m analysis of variance with repeated measures

For split time from 40m to 80m (sec.)

Source	SS	df	MS	F
Subjects	30.66	119	0.257	**0.50**
Trials	0.007	2	0.004	
Residual	2.203	238	0.009	

The table value required for significant at 0.01 level of confidence with degrees of freedom 1&119 is 4.78.

Table indicates that the obtained F ratio 0.50 is less than the table value of 4.78 required at 0.01 level of significant. This proved that there are no significant differences among three different testers. It reveals that the process of testing the split time from 40m to 80m is perfect and consistent.

Intraclass Correlation For Split Time From 40m To 80m(Sec.)

Source	SS	df	MS_E	R
Subjects	30.66	119	0.011	**0.92**
Trials	0.007	2		
Residual	2.203	238		

The table value required for significant at 0.01 level of confidence with degrees of freedom 1&119 is 0.234.

Above table indicates that the obtained intraclass (R) value 0.92 is higher than the table value 0.234 required at 0.01 level of significant. It denotes that the split time from 40m to 80m recorded by the three testers using the newly constructed electronic device at three different periodsare significantly related.

The above results strongly proved that the newly constructed electronic device possess objectivity to assess the split time from starting point to40m and 40m to 80m of sprinters on the track simultaneously for eight athletes.

Analysis of Data and interpretation of the study

The main purpose of this study was to construct an electronic device to assess the flying sprint performance of the sprinters and also to establish scientific authenticity of the instrument.

The setting up of scientific authenticity involves establishment of reliability, validity and objectivity.

Reliability was established by test and retest method. The obtained two sets of scores were subjected to univariate correlation procedure and Reliability was established

Validity was established by the Data were collected using the stop watches along with the newly constructed equipment and data were collected for the same subjects. Using these two sets of data, Pearson Product moment correlation was applied and coefficient of correlation was found out and the validity of the instrument was established.

Objectivity was established by collecting data using the same subjects, and same instrument, similar conditions were provided but two different testers were used. Thus two sets of scores were obtained and they were subjected to univariate correlation procedure which indicating that 95% association between these scores.

5. Conclusion

It is concluded that the device is more reliable and objective to assess the flying sprinttimings of sprinting events.

6. Recommendation

Device may be designed to assess the reading of track and field events.

Similar gadget may be designed to measure various motor fitness components.

References

[1] Anuparna Shah and SushmitaMandal, (1994).Effectiveness of three Instructional Strategies for Education Experiments in Education.
[2] Arlott, J. (1975), ***Medicine and Science in Sports and Exercise,***Saint Louis:Oxford Companion to Sports and Games, PP. 203-209.
[3] Balasubrarnanian and Yoganandam, "Trained teacher vs technology' A Comparative Study effectiveness in Improving English pronunciation", Journal of Research in Educational Media, 94, 25-30.
[4] Baumann, W. (1976), **Kinetic and Dynamic Characteristics of the Sprint Start Biomechanics,**saint Louis: The C.V.Mosby company, PP.195-198.
[5] Cheng, L. et.al. (2010), A Low-cost, Accurate Speed Tracking System for Supporting Sprint Coaching, ***Journal of Sports Engineering and Technology***, 3, PP. 149-152.
[6] Korchemny, R. (1992), A New Concept for Sprint Start and Acceleration Training. **New Studies in Athletics** 7, PP. 65-72.
[7] Mero P.V. Komi&Gregor R.J. (1992), **Biomechanics of Sprint Running,**Illinois: Human Kinetics, PP. 376-392.
[8] Salo, A. &Bezodis, I.N. (2004), ***Sports Biomechanics,***Saint Louis: The C.V.Mosby company, PP. 43-54.
[9] Suzuki, M. et. al. (1991),***Analysis of the Race Patterns of Men,***Saint Louis: The C.V.Mosby company, PP. 14 – 24.
[10] Thomas, Jerry R. &*Nelson*, Jack K. (1996), ***Research Methods in Physical Activity***, Ilinois: Human Kinetics, PP. 234-240.
[11] http://en.wikipedia.org/wiki/Fully_automatic_time
[12] http://en.wikipedia.org/wiki/Photo_finish
[13] http://www.answers.com/topic/photo-finish-camera#ixzz1tJtQH13j

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