

Sports Engineering Association



SportE



Volume. 2

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August 2024

FROM THE DESK OF EDITOR



Dr. Arun Kumar Jalan

Dear Readers,

Welcome to the fourth issue of SportE for 2024, proudly presented by the Sports Engineering Association (SEA). We want to express our deepest gratitude to all our contributors and the editorial team who have made this newsletter.

In this issue, we are excited to spotlight the exceptional achievements and contributions of our members within the realm of sports engineering. Their commitment and hard work are shining examples of the SEA's mission and values. This edition features a special section on the remarkable accomplishments of our members, including their involvement in workshops, publications, and other SEA activities.

You will find technical articles that delve into the importance of sports engineering and sports science, designed to enhance your understanding of this dynamic field. Additionally, we are thrilled to showcase the outstanding contributions of our students. By highlighting their achievements, we aim to inspire future generations to explore the exciting intersection of science and sports.

We are also pleased to welcome our new SEA members and share information about upcoming opportunities within the association. From internships and research programs to scholarships, we are dedicated to supporting the growth and development of our members.

We hope you enjoy this edition of SportE and encourage you to share your feedback and suggestions. Your input is invaluable as we continue to promote excellence in the application of engineering to the world of sports.

Thank you for your continued support.

Sincerely,

TECHNICAL ARTICLE

India and Olympics



Dr. Pintu Modak

Physical Education

Birla Institute of Technology & Science, Pilani (Rajasthan) India

The Paris Olympics 2024 is just over and India's performance as ever has sparked discussions again about the future of Indian sports.

The author of an article correctly said,"

“You Can't Just Water a Few Plants and Expect a Lush, Vibrant Garden”.

A total of 117 Indian athletes made up the contingent on the hunt for medals at the Paris Olympics, as for a country like India is very little which justifies the above statement. There are many issues contributing to the disheartening outcomes at the international events like Olympics which may take India more than a decade to fix. Maybe in the next 10 years, India might not win any medals, but addressing the issues first is important in order to build a sports culture.

The Government should focus on a bottom-up system with a structured pyramid program to create a sports culture instead of thinking so much about number of medals in Olympics. In the bottom- up system the training starts at community, club and school levels. In which, the children go through lower levels, until they have a talent, and then get recognized and selected for national program The world-class athletes need sustainable investment and planning over many years to ensure consistency in sports performance. India should have a vast pool of sporting talent to pick up from. China has one of the largest talent pools in the world to select an athlete from for Olympics. They have around 200,000 full-time athletes within their Olympic or Institute of Sports programs. Probabilities of "1" champion being produced out of that talent pool is thus much more likely, in comparison to the 1000 or few 1000 in other Olympic programs. But in case of India the same athletes may again be selected for the 2028 Olympics in Los Angeles Olympics, USA as lack of pool of athletes makes it less competitive within. There must be hundreds of Neeraj Chopra in the pool to pick up from. For all these the Government will have to invest heavily in infrastructures and facilities development in such a way that every child of the community can access to. It means to make

more sports facilities accessible to everyone, ensuring the children not to go more than 15 minutes away from their apartment or house. In short, the sports areas (sports infrastructures) per capita should be increased in the country. In Japan, sports areas per capita is 19 m² whereas in China it is 2.89 m² it means the China has around 365,900 sports venues across the country. India should also need to strengthen its role in social development, increasingly integrating sports training into the education system, and promoting the role of sports in the country's economy.

In fact, we invest on athletes not on talents as talents make a difference in sports performance. Moreover, the talents in the sports like gymnastics, swimming, diving, table tennis are ideal for other Olympic sports as the foundation of sports performance. But for India the question remains the same if we are ready for the changes and fix the issues first or will invest more on the isolated athletes as a short cut policy just to hunt for the medals in Olympics.

TECHNICAL ARTICLE**The Javelin's Flight Through Time****Timothy Kathu****Ph.D. Candidate, Yamagata University Japan**

The javelin, with origins tracing back to 708BC, has undergone remarkable transformations over time. Initially used for hunting and warfare involving simple wooden spears, the javelin evolved into a sophisticated instrument of athletic competition, governed by stringent technical specifications and engineered for optimal performance.

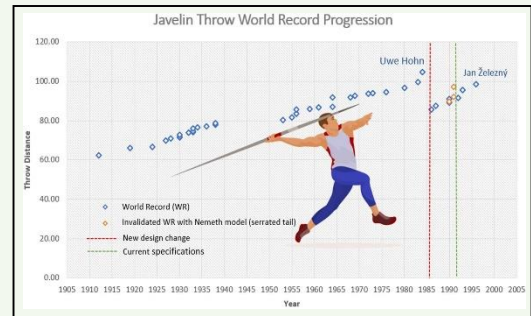
In the early 20th century, javelins were primarily wooden and fitted with metal tips. This basic design, however, soon faced challenges as the sport's competitive nature advanced. A pivotal shift occurred in the 1950s with the introduction of the Held javelin manufactured by Bud and Dick Held. Bud Held was himself an athlete who competed in the javelin throw and used his own designs. He held the world record twice, reaching 80.41m in 1953 and breaking his own record hitting 81.75m in 1955. This new design by the brothers featured a hollow wooden shaft and had 27% more surface area significantly improving throwing distances. The transition to a metal shaft further enhanced performance but introduced complications with point-first landings in distance measurement and consistency.

A new short-lived technique used around this time was the Spanish Javelin technique, in particular by Felix Erauzquin. The supposedly traditional Basque technique used a complete rotation of the body before releasing the javelin, similar to the discus throw. This was banned in 1956 as it posed a danger to the spectators since the javelin could be released in any direction. In spite of their prevalent use, the hollow design of Held javelins resulted in longer flight times and flatter landings. This unfortunately meant that it did not land with its tip in the ground, but instead continued to slide across the field after landing. This hollowness combined with a delayed pitching point gave these javelins a period of flight where the wind drastically affected the final landing point. They also had safety issues due to their unpredictability.

The 1980s marked a crucial period of redesign. Uwe Hohn's astonishing throw of 104.80m in 1984. Highlighted the potential hazards of the javelin's extended range. In 1986, the IAAF introduced substantial changes to the javelin's design to ensure easy measurement, safety and fair competition. A major modification was the repositioning of the javelin's centre of mass. By shifting the centre of mass 4cm forward, the javelin's flight trajectory was altered to ensure a more consistent point-first landing. This change addressed the previously problematic long-distance throws, which had caused issues due to the javelins landing flat. Contrary to myth, safety issues were not the primary reason for these changes nor were they due to Hohn's record. The changes had already been officially proposed not only to shorten distances but also to get rid of frequent flat or ambiguous landings, which often made it hard to assess if a

throw is legal. Hohn threw the World record 2 weeks before the LA Congress where the new rules came into being. Hohn also went on to coach Neeraj Chopra between 2017-2021, when Chopra won the Olympic gold medal.

The new specifications mandated that javelins weigh 800 gms and measure between 2.6 m and 2.7 m for men. This redesign aimed to reduce the flight distance and focus on improving landing accuracy. The aerodynamic properties were affected by these changes as moving the centre of mass forward increased drag and modified the lift forces acting on the javelin. The result was a javelin that dipped faster during flight, reducing the overall throw distance. Further changes in 1991 included a ban on special paints, surface treatments and serrated tails that affected aerodynamics. The objective was to ensure that all javelins conformed to standardized specifications, maintaining fairness in competition. The regulations on the thickness of the tail ensured that further modifications would not negate the centre of mass shift. As a result of the new changes, Hohn's 104.80m might stay eternal, with a new era for the sport under new specifications.



Today's javelins are the product of meticulous engineering: balancing weight, length and aerodynamic properties to achieve peak performance. The surface area of the javelin and its aerodynamic profile play critical roles in determining its flight characteristics. A streamlined surface minimizes drag, while precise weight distribution influences stability and trajectory. Modern performance metrics often focus on detailed kinematic analysis, including release speed and angle. For example, an increase of 1 mps in release velocity can result in an additional 5 m of throw distance.

Neeraj Chopra's gold medal at the Tokyo Olympics and his recent silver medal at the Paris Olympics spotlighted the javelin throw in India. His throw of 87.58 m and 89.45 m respectively was a testament to both his skill and the advanced engineering of modern javelins. However, despite these advancements, could achieving throws beyond 90m be influenced by physical attributes? Athletes such as Arshad Nadeem (2024 Olympics Gold with an Olympic record of 92.97m), Johannes Vetter (most 90m+ throws in history; yet to win a medal in the Olympics) and Andersen Peters (2- time World Champion; 2024 Bronze; personal best of 93.07m) highlight the role of body type and physical conditioning in surpassing these distances. Chopra's performance, while impressive, underscores that despite the technical advancements in javelin design, the physical attributes of athletes play a crucial role, with Chopra having yet to hit 90m (personal best of 89.94m) but hopefully will. A note for Indians fans: the commonly accepted best ever Javelin thrower in history, Jan Železný (who has held the World Record of 98.48m for close to 30 years while winning 3 Golds and 1 Silver in Olympics) has a similar body type to Neeraj Chopra.

The evolution of the javelin throw has been marked by significant technical and engineering advancements aimed at balancing performance, safety and fairness. From wooden shafts to precision-engineered designs, each change has impacted the sport's technical landscape. Whether future developments will involve further alterations to the javelin's physical properties, or if they will lead to a significant shift in the sport itself, remains to be seen.

ARTICLE

A Reflection on Attending an International Conference**Manish Meena****Graduate Student, IIT Gandhinagar**

Attending international conferences is always an enriching experience, and this sentiment was certainly enhanced during my recent visit to Loughborough University, United Kingdom, for attending and presenting my research paper at the 15th International Conference on Engineering of Sport. Held from 8th to 11th July 2024, this conference provided a unique opportunity to delve into the cutting-edge developments within the field of sports engineering, an industry that is continuously shaped by advancements in technology, societal influences, and the evolving expectations of athletes, fans, and governing bodies.

The conference's agenda was thoughtfully curated to stimulate discussions on the current and future trajectory of the sports engineering industry. It emphasized the collaborative efforts between industry, academia, and athletes to build the field forward, while also showcasing pioneering research that is set to revolutionize the sports sector. Over the course of the event, more than 150 presentations were delivered by researchers and professionals from across the globe, covering diverse themes such as Cycling, Surfaces, Measurement, Aerodynamics, Biomechanics & Modelling, Golf, Footwear, Women in Sport & Physical Activity, Sustainability, Parasport, among others. This thematic structure allowed participants to engage deeply with specific areas of interest, developing an environment helpful to intellectual exchange and collaboration.

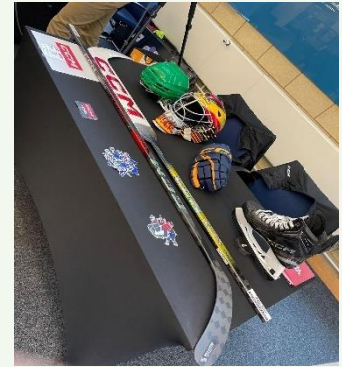


One of my primary expectations from the conference was to engage with like-minded researchers, exchange ideas, and gain insights into the ways in which sports technology is transforming modern sports. The conference not only met but exceeded these expectations. The opening ceremony, held at Loughborough University's iconic stadium, set the tone for the event, followed by a tour of the university's state-of-the-art sports labs. This tour offered a hands-on glimpse into the practical applications of sports engineering, from wind tunnels used in motorsport to robotic arms for golf training, and precise biomechanical measurement tools powered by advanced cameras and sensors. The exposure to such sophisticated technology draws attention to the significant impact that sports engineering can have, not just on elite sports but on the broader sports ecosystem.



The sessions of the conference were meticulously organized, ensuring that participants could engage with presentations that aligned with their research interests. The first day was particularly memorable, featuring a tech-loaded lab tour that brought the theoretical aspects of sports engineering to life. Day two and three were packed with paper and poster presentations, offering a wealth of knowledge and insights from researchers who have made significant contributions to the field. Additionally, the career guidance session for students aspiring to pursue sports engineering provided valuable perspectives from industry leaders and academic experts. This session highlighted the growing demand for skilled professionals in sports engineering and outlined clear pathways for those looking to build a career in this exciting field. The conference dinner on day three, held on a delightful summer evening, was a perfect blend of academic discourse and cultural exchange. The atmosphere was further enlivened by the live screening of the UEFA Euro Football Cup semi-finals, adding a touch of excitement to the evening.

The final day of the conference concluded with more paper presentations and the announcement of the best paper awards, recognizing outstanding contributions in various categories. As I reflect on my time at the conference, I am struck by the sheer breadth of knowledge I have gained and the new perspectives I have acquired. The exposure to different approaches and methodologies in sports engineering has broadened my understanding of the field and inspired me to think critically about how these advancements can be integrated into the Indian academic and sporting ecosystem.



One of the most significant takeaways from the conference was the realization of the limited presence of Indian researchers in this rapidly growing field. This observation has strengthened my resolve to contribute to the development of a robust sports engineering ecosystem in India, leveraging the knowledge and connections I have gained from this conference. The field of sports engineering is not only essential for the advancement of professional sports but also plays a crucial role in promoting community sports and general fitness of an individual in day to day life. The sophisticated labs and resources I witnessed at Loughborough University highlight the urgent need for Indian tech experts to explore and invest in this burgeoning field.

In conclusion, my experience at the 15th International Conference on Engineering of Sport was nothing short of transformative. I am deeply grateful to the Sports Engineering Association India for their support in facilitating my participation in this conference. The insights and connections I have gained will undoubtedly guide my future endeavors in sports engineering, as I aspire to collaborate with like-minded researchers and contribute to the advancement of sports technology in India. This experience has not only enhanced my academic journey but has also fueled my passion for driving innovation in sports engineering for the betterment of athletes and the broader sporting community of our country.

TECHNICAL ARTICLE

The Impact of Technology on Modern Sports



**Rehan Sumar,
CEO & MD GoSportz**

Technology has significantly transformed the landscape of sports, affecting everything from how games are played to how athletes train, how fans engage, and how sports are managed. The integration of advanced technologies has not only enhanced performance but also redefined the fan experience, pushing the boundaries of what is possible in sports.

Performance Enhancement

One of the most significant impacts of technology in sports is the enhancement of athletic performance. Wearable devices, such as GPS trackers, heart rate monitors, and smart clothing, allow athletes and coaches to collect and analyze data on various aspects of performance. This data-driven approach enables tailored training programs, helping athletes improve their strengths and address weaknesses with precision.

For example, in professional football, GPS tracking systems monitor players' movements during training and matches, providing insights into their speed, distance covered, and even the intensity of their play. This information helps coaches make informed decisions on tactics, substitutions, and training focus.

Injury Prevention and Rehabilitation

Technology has also revolutionized how injuries are prevented and treated in sports. Advances in medical imaging, such as MRI and ultrasound, allow for early detection of potential injuries, enabling preventive measures to be taken before they become serious. Additionally, rehabilitation technologies, including cryotherapy, hydrotherapy, and advanced physiotherapy equipment, have significantly shortened recovery times for athletes.

Moreover, the development of motion analysis systems helps in understanding the biomechanics of athletes, identifying harmful movements that could lead to injury. This proactive approach not only protects athletes' health but also extends their careers.

Decision-Making and Officiating

The use of technology has also transformed officiating in sports, making it more accurate and fair. Systems like the Video Assistant Referee (VAR) in football, Hawk-Eye in tennis and cricket and Goal Line Technology (GLT) have drastically reduced the number of incorrect decisions, which previously could have had significant consequences on the outcomes of matches.

These technologies ensure that the integrity of the game is maintained by providing precise and indisputable evidence to referees and officials. For instance, Hawk-Eye tracks the trajectory of the ball in tennis and cricket, ensuring that line calls are accurate to within millimeters.

Fan Engagement

Technology has not only impacted athletes and officials but has also transformed the way fans engage with sports. Social media platforms, live streaming, and virtual reality (VR) experiences have brought fans closer to the action than ever before. Fans can now follow their favorite teams and athletes in real-time, access behind-the-scenes content, and even participate in live discussions during games.

Virtual reality and augmented reality (AR) have taken fan engagement to another level, offering immersive experiences that make fans feel as though they are part of the game. For example, some sports broadcasters now offer VR experiences where fans can watch games from the perspective of the players or from any seat in the stadium, all from the comfort of their homes.

Data Analytics and Strategy

The role of data analytics in sports cannot be overstated. Teams and organizations are increasingly relying on big data to develop strategies, scout talent, and even make financial decisions. Advanced algorithms analyze vast amounts of data, uncovering patterns and trends that might not be evident to the human eye.

For example, in basketball, teams use analytics to determine the most effective shooting positions on the court, or in baseball, to decide on defensive shifts. This data-driven approach has led to the rise of "sabermetrics" in baseball and similar analytic methods in other sports, fundamentally changing how games are played and managed.

Ethical Considerations and Challenges

While the benefits of technology in sports are numerous, they also bring about ethical considerations and challenges. Issues such as data privacy, the potential for over-reliance on technology, and the widening gap between well-funded teams that can afford advanced technologies and those that cannot are topics of ongoing debate.

Moreover, the integration of technology into sports officiating, such as VAR (Video Assistant Referee) in football, has sparked controversy, with some arguing that it disrupts the flow of the game and that human error is an intrinsic part of sports. Balancing the use of technology with the preservation of the human elements of sports remains a key challenge.

Conclusion

Technology's influence on sports is profound and multifaceted, driving advancements in performance, safety, fan engagement, and strategic decision-making. As technology continues to evolve, its role in sports will only grow, offering new opportunities and challenges alike. The future of sports will undoubtedly be shaped by the ongoing integration of cutting-edge technologies, making it an exciting time for athletes, fans, and industry professionals.

TECHNICAL EVENTS ORGANIZED

Sports Engineering Workshop



Presentation by Dr Pallab Dasgupta, Dr Subir Debnath and Dr Pintu Modak the members of SEA in the Ministry of Youth Affairs and Sports Department, Agartala, Tripura on 16th - 19th June 2024.

National Workshop on Sports Engineering

National Workshop on Sports Engineering

Date: 23rd August 2024 Time: 10:00 am -12:30 pm

ORGANIZER
Sports Engineering Association, India

VENUE: Red Fox Hotel - Delhi Airport

Registration fee: Rs 500/ per participant
Includes a participation Certificate and Hi-tea

Last date of Registration: 15th August 2024 till 5:00 am
Seat available: 30 participants only on first come first serve basis

THEME
Engineering Application in Sports

Payment mode

PROF. MANI SANKAR DASGUPTA
Mechanical Engineering
BITS Pilani (Ra.)
Topic: Sports & Technology Integration in Education

PROF. ASHUTOSH BHATIA
Computer Science
BITS Pilani (Ra.)
Topic: Applications of Deep Learning and Computer Vision in Sports Engineering

PROF. KAMLESH TIWARI
Computer Science
BITS Pilani (Ra.)
Topic: AI and its application in sports

DR. PINTU MODAK
Physical Education
BITS Pilani (Ra.)
Topic: Perspective of Sports Engineering and Sports Science

Registration form
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UPI ID - 9636575446@okbizaxis

Contact Details:
Dr Pintu Modak
9636575446
sportsengineeringindia@gmail.com

The Sports Engineering Association of India successfully organized a National Workshop on Sports Engineering on August 23, 2024, at Red Fox Hotel, Delhi Airport. The event, themed "Engineering Application in Sports," brought together experts from BITS Pilani, including Prof. Mani Sankar Dasgupta, Prof. Ashutosh Bhatia, Prof. Kamlesh Tiwari, and Dr. Pintu Modak.

They delivered insightful talks on topics such as the integration of sports and technology in education, applications of deep learning and computer vision in sports engineering, AI in sports, and the perspective of sports engineering in sports science.



Annual General Meet of Sports Engineering Association India



The Sports Engineering Association (SEA) India recently held its Annual General Meeting on 23rd August 2024 at the Red Fox Hotel, New Delhi. During this event, key discussions centered around the growth and future direction of SEA India. The meeting also saw the election of new members who will lead the association in the upcoming tenure.

We extend our heartfelt congratulations to all the newly elected members and wish them great success as they lead SEA India towards greater heights in the field of sports engineering.

NEW MEMBERS, LIFETIME, SEA



L/2024/21/08/10063

Dr. Subramanya K N

Principal

RV College of Engineering, Bengaluru

NEW MEMBERS, ANNUAL, SEA



A/2024/06/28/10035

Dr. Randhir Singh Pathania

Director Sports, Physical Education

Sant Baba Bhag Singh University Jalandhar



A/2024/07/19/10036

Rakesh Vishwakarma

Convener

Dept of Physical Education & Sports, SMIT, Sikkim

NEW MEMBERS, STUDENT



S/2024/07/10/1014

Mr. Sadanand Venkataraman

M.Tech Student

Shiv Nadar University, Chennai

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2. Ministry of Youth Affairs & Sports, New Delhi, India
3. Shiv Naresh Sports Pvt Ltd
4. SporTech Innovation Lab Pvt Ltd, Pune, India

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Roorkee, Uttarakhand, India



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IIT Gandhinagar
Gandhinagar, Gujarat, India

STUDENT PROJECT SCHEME

Project financial support

We encourage students from engineering and science disciplines to actively participate in various activities such as product design, movement analysis, app development, and software development. To support their involvement, we are announcing a cash support program. All student members are eligible to apply, and the application process is open throughout the year. To apply, please submit a one-page summary of your project along with your student membership number to sportsengineeringindia@gmail.com.

Additionally, SEA (Sports Engineering Association) provides funding opportunities to student members for undertaking small projects in sports technology. We also strive to offer them a nationwide platform to showcase their development work through newsletters and conferences.

Student Project Scheme

The Student Project Scheme is a core element of our commitment to fostering innovation and research in sports technology. The scheme is aimed at encouraging individual student members or groups to delve into innovative technology applications within the sports domain.

Key Features of the Scheme:

zFinancial Support: Students can apply for funding of up to Rs. 10,000 to facilitate their research projects or the development of prototypes, models, or products.

1. Duration: Projects under this scheme should be completed within a six-month timeframe, allowing students to channel their efforts efficiently.
2. Application Procedure: The detailed application procedure, including eligibility criteria and submission guidelines, can be accessed on the SEA website: <http://sportsea.org> We encourage all full-time undergraduate or postgraduate students in engineering, science, or sports science to consider joining SEA as student members to avail themselves of these exciting opportunities.

Showcasing Development Work

SEA recognizes the importance of providing a platform for students to showcase their projects and findings. We facilitate this through newsletters and conferences, ensuring that their efforts gain visibility at a national level.

Embrace this opportunity to turn your innovative ideas into reality with the support of SEA's Student Project Scheme. We are dedicated to nurturing the next generation of sports engineers and scientists, driving advancements that will shape the future of sports technology. Join us in this exciting journey of exploration and innovation!

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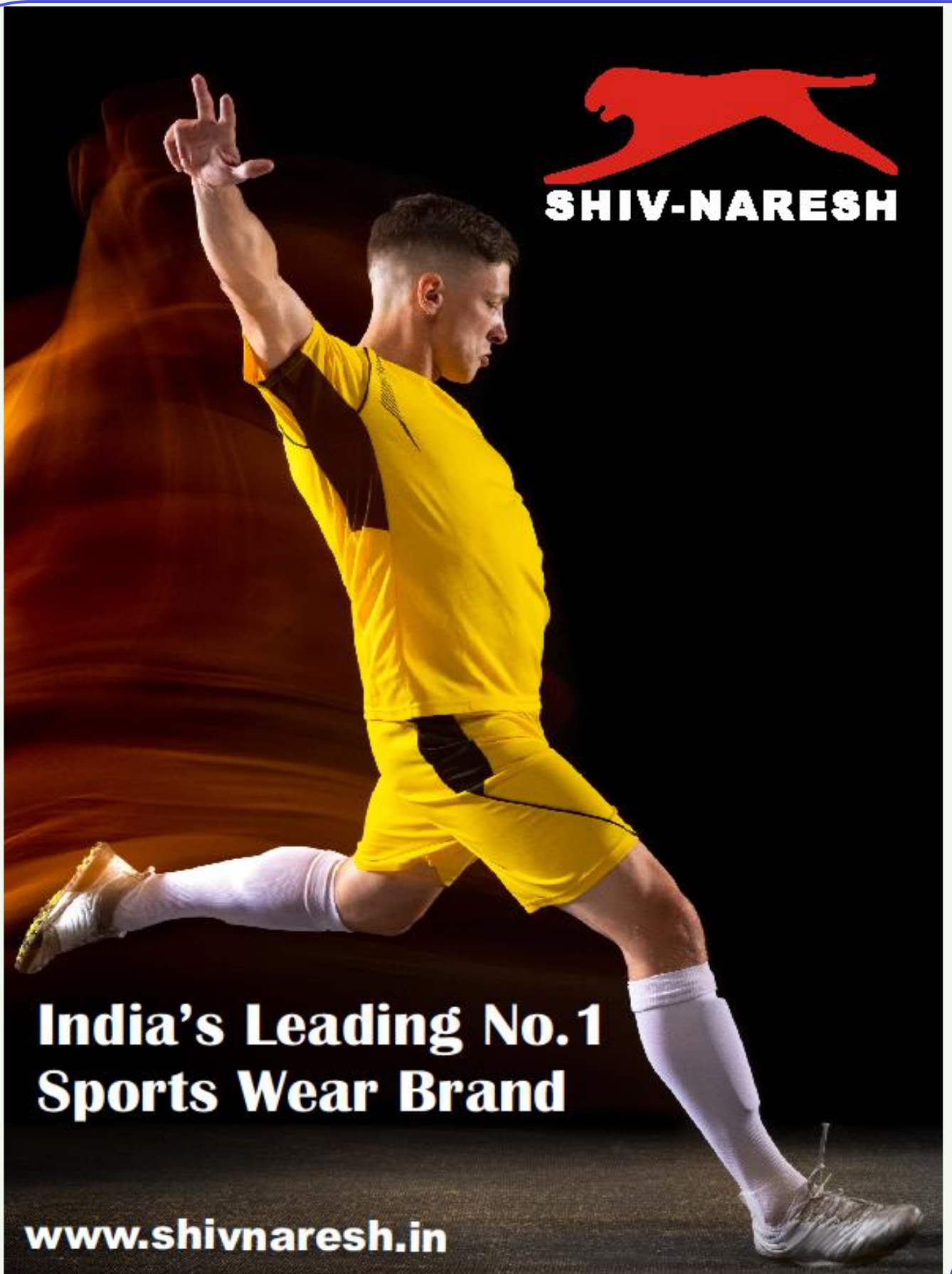
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We invite you to join us and become a member of the SEA family. Your expertise is important for us to take the mission of SEA forward.

Membership Link: <http://sportsea.org/joining-payment-process/>

Opportunities/ Benefits of joining the SEA as Member:

1. Receive a Membership Certificate, inclusion of profile in Membership Gallery, discount on Conference registration charges
2. Opportunity to utilize the collaborative platform to interact with Domain experts and other members of SEA
3. Discount on conferences, workshops and any other professional development events organized by SEA
4. Student members may get an opportunity to work in research projects
5. Receive periodicals / newsletter, publish articles in periodicals & newsletters
6. Receive award / recognition for innovative contribution to the technology development Attend board meetings (only for life members)
7. Opportunity to open State Chapter (only for life members)
8. * (A full-time student at any time during her/his period of study can join SEA as Student Member through a onetime payment of token membership fee. Student members are eligible to get Rs 10,000/- as grant for innovative project development. On completion of course, he/she will cease to be a Student Members but are encouraged to make fresh application for Life membership of SEA remitting the full life membership fee.)

Sports Engineering Association

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