KEY INDICATOR 7.3

7.3.1 - Highlight the performance of the institution in an area distinct to its priority and thrust:

Certified that the following are the documents and geo-tagged photos showing the performance of the University in an area distinct to its priority and thrust.

INNOVATIVE LABORATORIES FOR DISSEMINATION OF SPORTS KNOWLEDGE

Sl. No.	Name of the Laboratory	Page Nos.
1	Center of Excellence in Biomechanics	1 - 46
2	Computerized Low-Speed Subsonic Wind Tunnel Laboratory	47 - 57
3	Computational Sports Technology Laboratory	58 - 67
4	Exercise Physiology and Sports Nutrition Laboratory	68 - 80
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Registrar

Registrar
Tamilnadu Physical Education
and Sports University
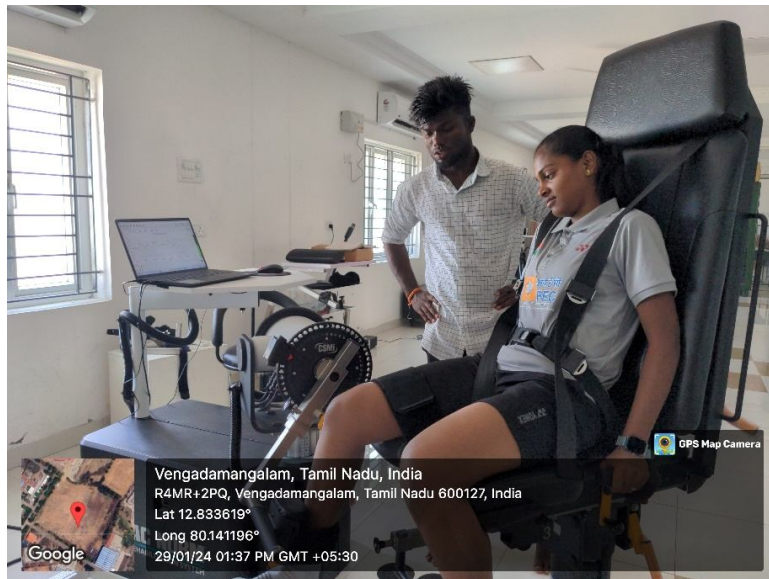Chennai.

TAMIL NADU PHYSICAL EDUCATION AND SPORTS UNIVERSITY
Melakottaiyur, Chennai - 127

CENTER OF EXCELLENCE IN BIOMECHANICS

The Centre of Excellence in Biomechanics in the University campus established at a cost of ₹13.09 crores and funded by the Tamil Nadu Innovative Initiative Scheme of Government of Tamil Nadu, spans in an area of 21,000 square feet. As the largest sports biomechanics lab in South Asia, equipped with advanced sports biomechanics equipment, including a 3D motion capture system with 14 cameras, 38 force plate locations, a 32-channel EMG system, an anthropometry chair, and an isokinetic dynamometer. The lab operates with advanced software like QTM, Visual 3D, BioWare, and MARS. It serves students, researchers, and academicians in sports science and physiotherapy, as well as novel and elite athletes of all sports and games at all levels.

The facility conducts biomechanical assessments for athletes ranging from high school to elite levels to enhance sports performance, identify talents and avoid injuries. Many State, National and International athletes and teams, PhD Research scholars and the students of this University and other Institutions have benefitted from this Center. This Centre stands as a model Sports Biomechanics for the whole country with potential service to the sports fraternity which paves a way for enriching sports biomechanics fraternity and sports science at large.

1. BIOMECHANICAL ANALYSIS OF TOP JUNIOR WOMEN BADMINTON PLAYER
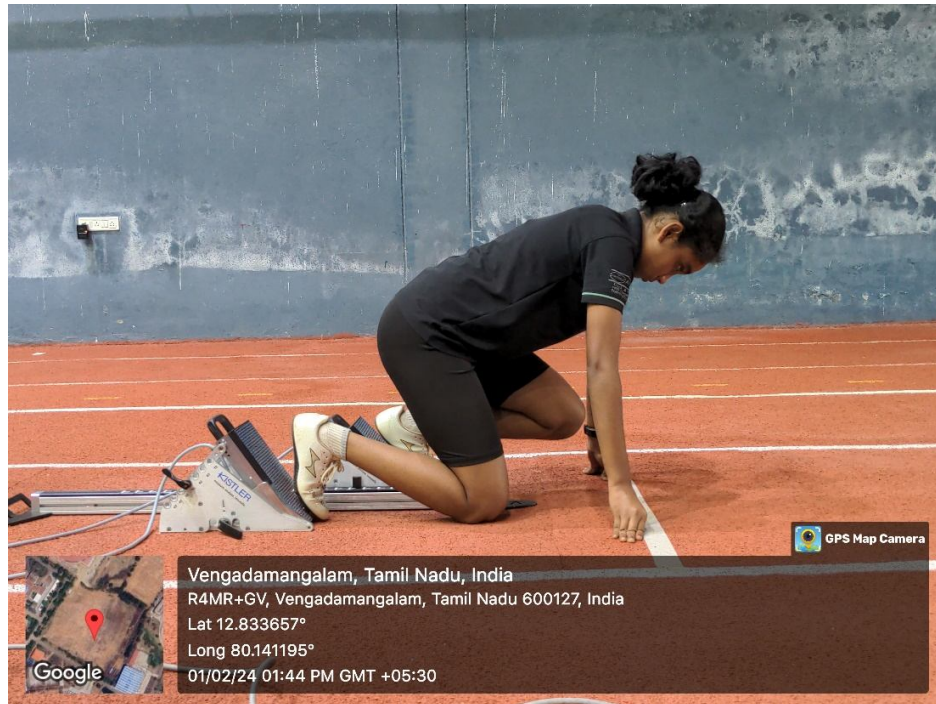
2. BIOMECHANICAL ANALYSIS FOR THE JUNIOR GIRLS AND BOYS ATHLETICS TEAM FROM MADURAI

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3. **BIOMECHANICAL ASSESSMENT FOR THE BOYS AND GIRLS OF MODEL SCHOOL KANCHIPURAM and CHENGALPET FEBRUARY 2024**

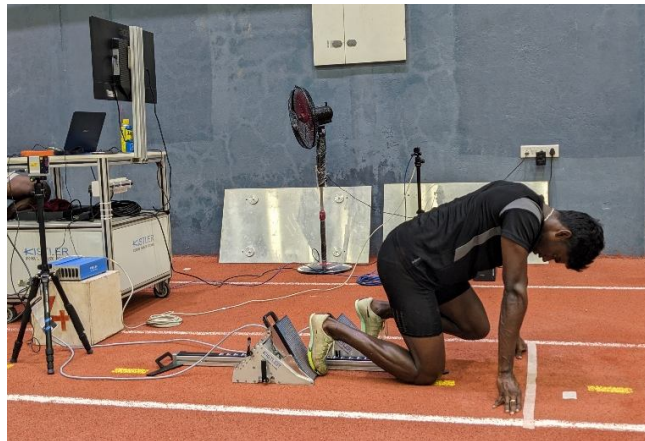4. **PRE-ASSESSMENT DISCOURSE: PLANNING BIOMECHANICS ANALYSIS FOR MODEL SCHOOL CHILDREN FEBRUARY 2024**

5. **"EXPLORING FACILITIES: SDAT ROMANIAN COACH BEDROSE'S LAB VISIT FOR ASSESSMENT PLANNING WITH THE CEB - HPC" NOVEMBER 2023**

6. BIOMECHANICAL ASSESSMENT FOR THE SDAT TEAM OF COACH BEDROS DECEMBER 2023

7. UNIVERSITY-LEVEL WEIGHTLIFTING CHAMPIONSHIP AT THE BIOMECHANICS LABORATORY 2023

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8. BIOMECHANICS LAB VISIT BY FDDI DIRECTOR DR. MADHUSUDAN PAL 2023

9. ASSESSMENT FOR THE TAMILNADU JUNIOR GIRLS HOCKEY TEAM SELECTION

10. WALL-MOUNTED FORCE PLATE WITH MANNEQUIN

11. CEB - HPC WEIGHT LIFTING PLATFORM
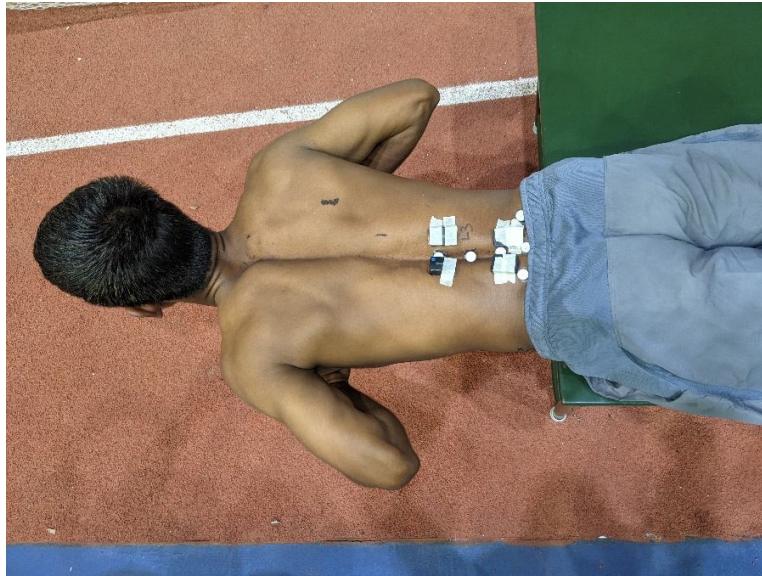

12. KISTLER FORCE PLATE

13. EMG SENSORS

14. ONE DAY WORKSHOP ON BASKETBALL

15. BIOMECHANICAL ASSESSMENT FOR THE SAI – EXCELLENCE JUNIOR MEN HOCKEY PLAYERS

16. ASSESSMENT FOR THE TAMIL NADU JUNIOR BOYS HOCKEY PLAYERS

17. ONE- DAY WORKSHOP FOR THE CLRI – GAIT COURSE STUDENTS ON BIOMECHANICS AND LABORATORY EQUIPMENT

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18. BIOMECHANICAL ASSESSMENT FOR THE JAVLINE THROWER MR.BRAVE MEN

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19. ASSESSMENT FOR SPRINTERS AND JUMPERS OF COACH WAYNE PEPPIN ACADEMY STUDENTS

20. EQUIPMENT DEMONSTRATION TO THE STUDENTS BY VALD PERFORMANCE TEAM

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21. SESSION FOR THE BIOMECHANICS DEPARTMENT STUDENTS ON BIOMECHANICS AND ITS SCOPE BY DR. CHITTI BABU

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22. EXPLORING FACILITIES OF BIOMECHANICS LABORATORY: THE HINDU NEWS TEAM VISITED AND EXPLORED ABOUT THE LABORATORY, TECHNOLOGY AND ITS FUNCTIONS

23. KEYSPRINT ASSESSMENT FOR ROYAL ATHLETICS CLUB - CHENNAI SENIOR ATHLETES

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24. WORKSHOP ON GOLF BIOMECHANICS

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25.7 DAYS BIOMECHANICS WORKSHOP FOR THE PHYSIOTHERAPY STUDENTS FROM GUJARAT

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Lat 12.835598°
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26. ONE DAY BIOMECHANICS WORKSHOP FOR THE PONDICHERRY UNIVERSITY STUDENTS

27. WORKSHOP ON THE ISOKINETIC DYNAMOMETRY FOR THE STUDENTS
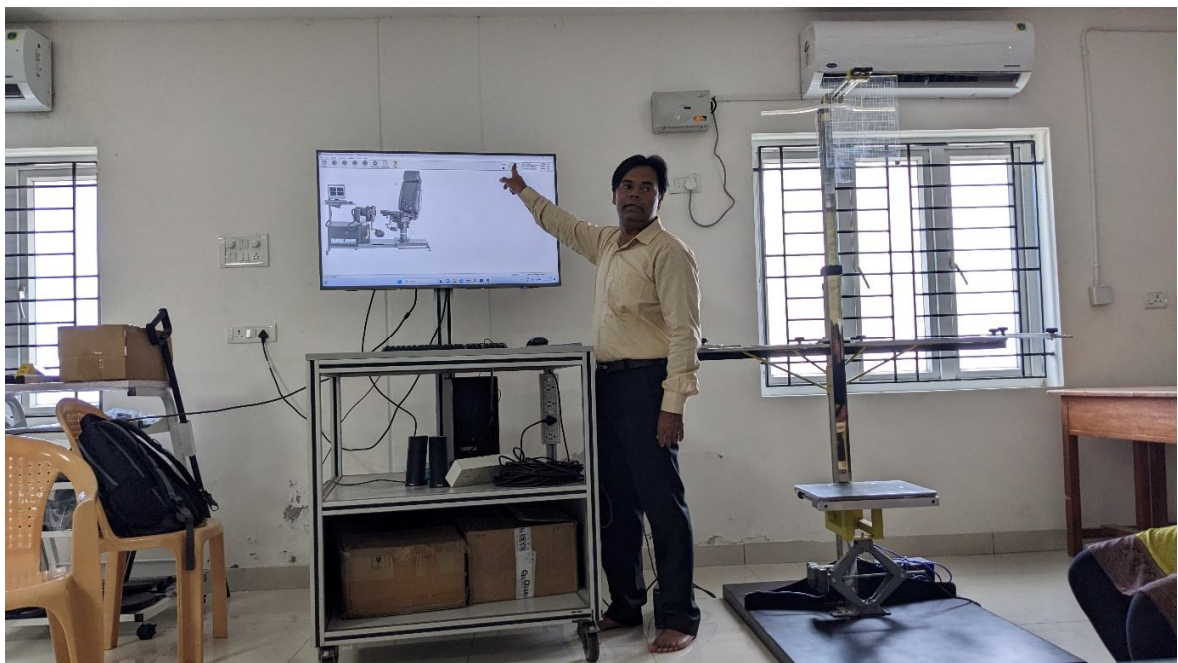
28. SPOTLIGHT ON BIOMECHANICS: INTERVIEW WITH SUN TV ON LABORATORY INNOVATIONS

29. KI- SPRINT INSTRUMENTED STARTING BLOCK

30. THREE DAYS BIOMECHANICS WORKSHOP WITH PRACTICALS FOR THE STUDENTS OF KMCT COLLEGE OF PHYSIOTHERAPY, KERALA

31. ONE DAY BIOMECHANICS WORKSHOP FOR THE COACHES AND MANAGERS DURING ALL INDIA INTER UNIVERSITY ATHLETICS COMPETITION 2023

32. BIOMECHANICS ASSESSMENT FOR JUNIOR GIRL'S TENNIS PLAYER

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33. SERB project team from SSN College of Engineering for EMG data analysis

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GPS Map Camera

34. Assessment of Archers in 2022

35. Assessment of Hockey players from Karnataka in 2022

36. Biomechanics workshop by Dr.Saju Joseph

Vengadamangalam, Tamil Nadu, India
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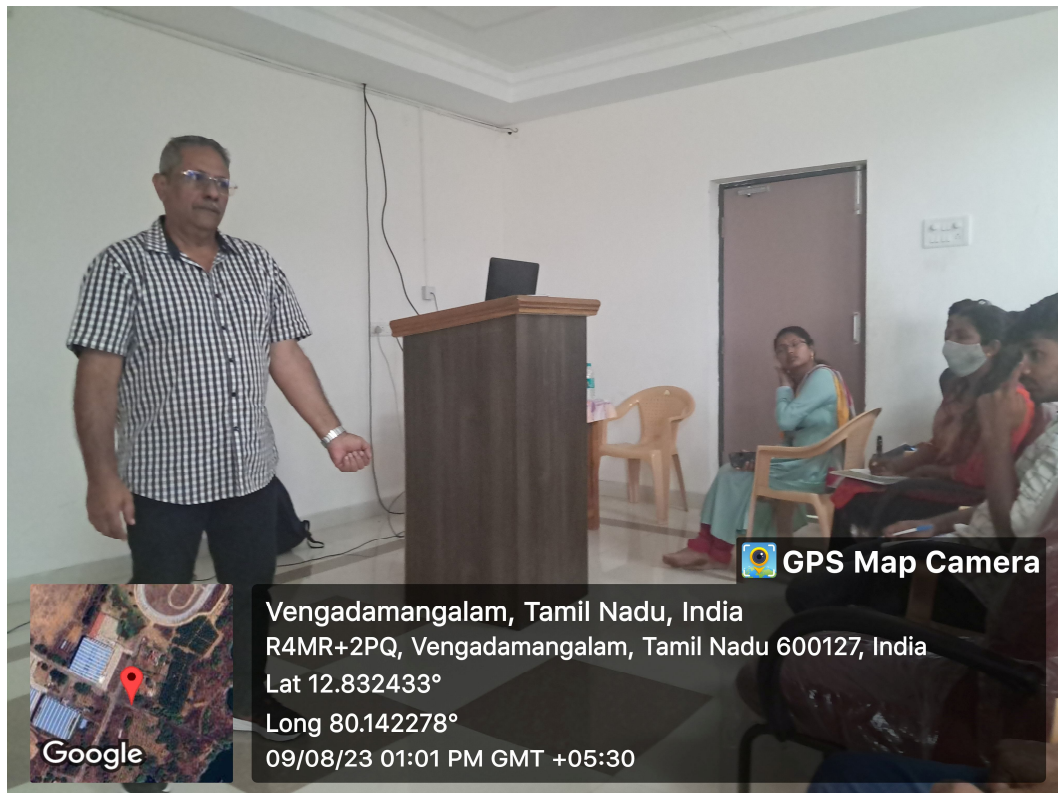
37. Practical session for our students

38. Indian bank sports science assessment by our biomechanics students

39. Demonstration by VLAD force sensor company, Australia to our students

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40. Dr.P.Rajinikumar as Resource person for International conference in Sports Science in SRILANKA

Muttettuwegama, Sabaragamuwa Province, Sri Lanka
PQ6V+52C, Muttettuwegama, Sri Lanka
Lat 6.709975°
Long 80.792999°
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TAMIL NADU PHYSICAL EDUCATION AND SPORTS UNIVERSITY

COMPUTERIZED LOW-SPEED SUBSONIC WIND TUNNEL LABORATORY

INTRODUCTION:

Computerized Low-Speed Subsonic Wind Tunnel Laboratory offers, a state-of-the-art facility dedicated to advancing sports science and engineering. This laboratory is equipped with a sophisticated low-speed wind tunnel, precisely controlled by advanced computer systems, ensuring high accuracy and reliability in experimental results.

Our wind tunnel features a test section with dimensions of 30 cm by 30 cm by 60 cm, allowing for detailed examination of aerodynamic properties in a controlled environment. Capable of generating wind speeds up to 25 meters per second, the tunnel is designed to simulate a variety of real-world conditions encountered in sports.

This facility plays a crucial role in optimizing athletic performance and equipment design. By analyzing the aerodynamic forces acting on sports equipment and athletes, researchers and engineers can develop innovations that enhance speed, efficiency, and overall performance. Whether it's fine-tuning the design of a racing bicycle, improving the aerodynamics of athletic apparel, or studying the airflow around a football, our laboratory provides the tools and expertise necessary to drive

progress in sports technology. We push the boundaries of sports science, leveraging cutting-edge technology to unlock new levels of performance and innovation.

PURPOSE/ OBJECTIVES:

-Aerodynamic Analysis and Optimization:

- Investigate and optimize the aerodynamic properties of various sports equipment and apparel to enhance performance and efficiency.

-Athlete Performance Enhancement:

- Study the aerodynamic impact on athletes in different sports to identify techniques and equipment that can reduce drag and improve speed and endurance.

-Equipment Design and Testing:

- Facilitate the design and testing of sports gear, including bicycles, helmets, and racing suits, to ensure they meet the highest standards of aerodynamic efficiency.

-Simulation of Real-World Conditions:

- Recreate and analyze specific environmental conditions that athletes encounter, helping to prepare them for competitions by understanding how wind and airflow affect performance.

-Research and Development:

- Provide a platform for conducting cutting-edge research in sports science, focusing on innovative solutions to improve athletic performance through aerodynamic advancements.

-Educational and Training Resource:

- Serve as an educational tool for students and professionals in sports engineering, providing hands-on experience with advanced aerodynamic testing and analysis techniques.

-Validation of Computational Models:

- Validate and refine computational fluid dynamics (CFD) models by comparing them with experimental data obtained from wind tunnel testing.

-Development of Best Practices:

- Establish and disseminate best practices for the design and use of aerodynamic sports equipment, contributing to the overall advancement of sports technology.

-Environmental Impact Studies:

- Analyze the environmental impact of different materials and designs, promoting the development of eco-friendly sports equipment without compromising performance.

SIGNIFICANCE:

The Computerized Low-Speed Subsonic Wind Tunnel Laboratory holds immense significance in the realm of sports science and engineering, impacting various aspects of athletic performance, equipment design, and overall sports innovation. Here are the key points that underscore its importance:

-Enhancement of Athletic Performance: By providing precise aerodynamic analysis, the laboratory helps athletes and teams optimize their techniques and equipment, leading to significant improvements in speed, efficiency, and endurance. This can be crucial in competitive sports where even marginal gains can make the difference between winning and losing.

-Innovative Sports Equipment Design: The facility enables detailed testing and refinement of sports gear, ensuring that designs are aerodynamically efficient. This leads to the development of cutting-edge equipment that can enhance an athlete's performance while ensuring safety and comfort.

-Empirical Validation of Theoretical Models: The wind tunnel allows for the validation and refinement of computational fluid dynamics (CFD) models through experimental data. This enhances the accuracy of simulations used in the design and testing process, leading to more reliable and effective sports equipment.

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-Preparation for Competitive Conditions: Athletes can train under simulated conditions that mimic real-world environments, helping them to better prepare for actual competitions. This can reduce the impact of unexpected variables and improve their performance during events.

-Educational Advancement: The laboratory serves as a vital educational resource, offering students and professionals hands-on experience with advanced aerodynamic testing. This fosters a deeper understanding of sports science and encourages the next generation of sports engineers and researchers.

-Environmental Sustainability: The facility can analyze the environmental impact of different materials and designs, promoting the development of sustainable sports equipment. This ensures that advancements in sports technology do not come at the expense of the environment.

-Performance Optimization across Various Sports: The versatility of the wind tunnel allows for the study and enhancement of performance in a wide range of sports, from cycling and skiing to running and team sports. This broad applicability maximizes the lab's impact on the sports industry.

-Promotion of Health and Safety: By testing and improving the aerodynamics of sports equipment, the laboratory contributes to the development of gear that not only enhances performance but also ensures the safety and well-being of athletes.

FORMATION OF LABORATORY:

The total investment made for establishing this Laboratory is Rs. 30.61 Lakh. which was fully funded by Government of Tamil Nadu. This laboratory is having the following equipment and software: Wind Tunnel and Computers.

OPERATIONS:

The operations of the Computerized Low-Speed Subsonic Wind Tunnel Laboratory are meticulously designed to ensure precise aerodynamic testing, efficient use of resources, and the safety of personnel and equipment. Here are the key operational procedures:

1. **Setup and Calibration**:
   - o **Initial Calibration**: Before any testing begins, the wind tunnel is calibrated to ensure accuracy. This involves checking the velocity sensors, pressure gauges, and data acquisition systems.
   - o **Environmental Control**: The lab environment is controlled to maintain consistent temperature and humidity levels, minimizing variables that could affect test results.

2. **Specimen Preparation**:
   - o **Model Fabrication**: Sports equipment and athlete models are prepared according to specific dimensions and material requirements. This may involve 3D printing, machining, or assembling parts.
   - o **Mounting:** Specimens are securely mounted on the testing platform within the wind tunnel, ensuring stability during testing.

3. **Test Planning and Execution**:
   - o **Test Design**: Detailed test plans are developed, specifying the objectives, testing parameters (such as wind speed, angle of attack, and duration), and data to be collected.
   - o **Computer Control Setup**: The wind tunnel's computer control system is programmed with the test parameters. This includes setting the desired wind speed (up to 25 m/s) and adjusting the tunnel's configuration as needed.
   - o **Safety Checks**: Pre-test safety checks are conducted to ensure that all systems are functioning correctly and that the test area is clear of unauthorized personnel.

4. **Data Collection and Analysis**:
   - o **Real-Time Monitoring**:During the test, data is collected in real-time, including velocity profiles, pressure distributions, and force measurements.
   - o **High-Speed Cameras and Sensors**: High-speed cameras and various sensors capture detailed information about airflow patterns and the aerodynamic behavior of the test specimen.
   - o **Data Storage and Processing**: Collected data is stored securely and processed using specialized software to generate meaningful insights and visualizations.

5. **Post-Test Procedures**:
   - o **Specimen Removal**: After testing, specimens are carefully removed from the wind tunnel.
   - o **Data Review**: Initial data review is conducted to ensure all required information has been captured accurately.
   - o **Tunnel Reset**: The wind tunnel is reset and calibrated for the next test, ensuring consistency between tests.

6. **Reporting and Documentation**:
   - o **Data Analysis Reports**: Comprehensive reports are generated, detailing the test conditions, methodologies, results, and interpretations. These reports include graphical representations of airflow patterns and aerodynamic forces.
   - o **Review and Discussion**: Test results are reviewed with stakeholders, including athletes, coaches, engineers, and researchers, to discuss findings and potential improvements.

7. **Maintenance and Upkeep**:
    - ○ **Regular Maintenance**: Routine maintenance is performed on the wind tunnel and associated equipment to ensure optimal performance and longevity. This includes checking mechanical components, recalibrating sensors, and updating software.
    - ○ **Upgrades and Enhancements**: Periodic upgrades are implemented to incorporate the latest technological advancements, enhancing the lab's capabilities.

8. **Safety and Compliance**:
    - ○ **Safety Protocols**: Strict safety protocols are adhered to at all times, ensuring the well-being of personnel and the integrity of equipment.
    - ○ **Regulatory Compliance**: The lab operates in compliance with relevant regulations and standards, ensuring ethical and responsible research practices.

BENEFICIARIES:
- Teams and Coaches get benefited.
- Ph.D., Researchers involved in the field of Sports Technology.
- Engineers who are pursuing their masters (M.Tech., in Sports Technology).
- Athletes get benefited in achieving their performance improvement.

OVERALL OUTCOME:
- Enhanced Athletic Performance
- Innovative Sports Equipment design
- Advanced Research and Development
- Educational Advancements
- Collaboration and Innovation

- Regulatory and Safety Improvements

- Environmental Sustainability

- Better Prepared Athletes

- Overall Sports Advancement

- Educating the students in Sports Aerodynamics

- Conducting the workshop in Sports Aerodynamics

CONCLUSION:

The Computerized Low-Speed Subsonic Wind Tunnel Laboratory for Sports represents a significant advancement in the field of sports science and engineering. By providing precise aerodynamic analysis and cutting-edge testing capabilities, this facility drives innovation, enhances athletic performance, and fosters the development of high-quality sports equipment. The wide range of beneficiariesfrom athletes and coaches to design development for manufacturing, researchers, and regulatory bodieshighlight the comprehensive impact of the laboratory.Through its meticulous operations, the laboratory not only improves performance and safety standards but also contributes to educational advancement and environmental sustainability. The collaboration and knowledge sharing facilitated by the lab promote continuous improvement and set new benchmarks in sports technology.In summary, the Computerized Low-Speed Subsonic Wind Tunnel Laboratory for Sports is a pivotal resource that elevates the standards of sports practice and competition, ensuring that athletes and teams can achieve their highest potential. As a beacon of innovation and excellence, it stands as a testament to the power of technology and research in shaping the future of sports.

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TAMIL NADU PHYSICAL EDUCATION AND SPORTS UNIVERSITY

COMPUTATIONAL SPORTS TECHNOLOGY LABORATORY

Introduction:

The Computational Sports Technology Laboratory leverages industry-leading software to drive innovation in sports science and engineering. We utilize licensed versions of ANSYS Fluent on five systems for comprehensive computational fluid dynamics (CFD) simulations, enabling detailed aerodynamic analysis to optimize sports equipment and apparel. Dartfish software on a dedicated system provides advanced motion analysis and performance breakdowns, offering valuable insights for technique improvement. Our data analysis and visualization are powered by Python, and the free version of Tableau. Python, with its extensive libraries, handles diverse data manipulation and visualization tasks. Tableau facilitates the creation of interactive dashboards, presenting complex data clearly and accessibly. Integrating these powerful tools ensures our laboratory remains at the forefront of sports technology research, enhancing athletic performance and developing innovative sports solutions.

Purpose/ Objectives:

The Computational Sports Technology Laboratory is dedicated to advancing the field of sports science and engineering through the strategic use of cutting-edge software tools. Our objectives encompass:

1. **Advanced Aerodynamic Analysis**: Utilize ANSYS Fluent for detailed computational fluid dynamics (CFD) simulations to optimize the aerodynamic performance of sports equipment and apparel, enhancing speed, efficiency, and athlete comfort.

2. **Motion Analysis and Performance Enhancement**: Employ Dartfish software to analyze athlete motion and performance, providing insights for technique refinement and injury prevention strategies.

3. **Data-driven Insights**: Harness Python for sophisticated data analysis, facilitating the extraction of meaningful insights from complex datasets related to biomechanics, performance metrics, and equipment design.

4. **Visualization and Communication**: Utilize Tableau to create interactive visualizations and dashboards, effectively communicating research findings and performance analytics to stakeholders in a clear and accessible manner.

5. **Innovation and Research**: Conduct pioneering research in sports technology, leveraging software capabilities to develop innovative solutions that push the boundaries of athletic performance and equipment design.

6. **Education and Collaboration**: Serve as a hub for collaboration between researchers, sports professionals, and industry stakeholders, fostering interdisciplinary partnerships and advancing knowledge in sports science and engineering.

7. **Continuous Improvement**: Maintain a commitment to continuous improvement by staying updated with the latest software advancements and methodologies, ensuring our laboratory remains at the forefront of sports technology innovation.

Significance:

The Computational Sports Technology Laboratory holds significant importance as a pioneering hub for advancing sports science and engineering through state-of-the-art software tools. By leveraging ANSYS Fluent, Dartfish, Python, and Tableau, the lab conducts advanced aerodynamic analyses, motion assessments, and data-driven research essential for optimizing sports equipment, enhancing athlete performance, and preventing injuries. Its capabilities in visualization and communication empower stakeholders with clear insights, while its role in innovation fosters groundbreaking discoveries and solutions in sports technology. The laboratory's collaborative environment not only cultivates interdisciplinary partnerships but also ensures continuous improvement and leadership in the field, ultimately shaping the future of sports through cutting-edge research and development efforts.

Formation of Laboratory:

The total investment made for establishing this Laboratory is Rs. 12,56,599/- which was fully funded by Government of Tamil Nadu. This laboratory is having the following equipment and software: Computers – 6, 3KV Inverter - 1, Printer - 1, Ansys licenced Software - 5 User, Dartfish license Software - 1 User and Basler High Speed Camera - 1 No.

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Operations:

The Computational Sports Technology Laboratory operates with a structured approach to utilize advanced software tools effectively, driving innovation and research in sports science and engineering. Here's a detailed overview of its operations:

- **Software Utilization and Setup**:

    ANSYS Fluent (Licensed): Utilized on five licensed systems, ANSYS Fluent enables detailed computational fluid dynamics (CFD) simulations. These simulations focus on optimizing the aerodynamic performance of sports equipment and apparel. The setup involves

configuring simulation parameters such as flow conditions, geometry, and boundary conditions to accurately model airflow around various sports-related objects.

Dartfish(**Licensed**): Dedicated to motion analysis and performance breakdowns, Dartfish software is used for capturing and analyzing athlete movements. It aids in identifying biomechanical factors affecting performance, refining techniques, and strategizing injury prevention measures.

Python (OpenSource): These versatile programming languages are employed for comprehensive data analysis tasks. Python, with libraries like NumPy, SciPy, Matplotlib, and Pandas, handles diverse data manipulation tasks, providing flexibility in research methodologies and analysis approaches.

Tableau (Free Version): Tableau is used for creating interactive visualizations and dashboards that effectively communicate research findings and performance analytics to stakeholders. It enhances data interpretation by presenting complex datasets in a clear and accessible format, facilitating informed decision-making and collaboration.

- **Experimental Design and Execution:**

  Aerodynamic Analysis: Using ANSYS Fluent, experiments are designed to simulate airflow patterns and aerodynamic forces on sports equipment such as helmets, bicycles, and apparel. Parameters such as wind speed, angle of attack, and turbulence levels are systematically varied to analyze their impact on performance.

Motion Analysis: Dartfish captures high-speed video footage of athletes performing various movements. Detailed motion analysis is conducted to assess technique efficiency, detect biomechanical inefficiencies, and recommend adjustments to improve performance and reduce injury risk.

- **Data Acquisition and Processing**:

  Data Collection: Experimental data from simulations and motion capture sessions are collected systematically using the respective software tools.

  Data Integration: Integration of data from different sources (CFD simulations, motion analysis, performance metrics) enables holistic analysis to derive comprehensive insights into athletic performance and equipment behavior.

- **Analysis and Interpretation**:

  Statistical Analysis: Dartfish and python perform statistical analyses on collected data, identifying trends, correlations, and anomalies related to aerodynamic efficiency, biomechanical performance, and equipment design.

  Visualization: Tableau is utilized to create visual representations of data, including graphs, charts, and interactive dashboards. These visuals aid in interpreting complex data sets and communicating findings effectively to researchers, coaches, athletes, and industry partners.

- **Reporting and Collaboration:**

    Research Reports: Comprehensive reports are generated detailing experimental setups, methodologies, results, and conclusions drawn from data analysis. These reports serve as valuable documentation for internal review and external publication.

    Collaboration: The laboratory fosters collaboration among researchers, sports professionals, equipment designing for manufacturing, and regulatory bodies. Regular discussions and presentations ensure knowledge sharing, feedback incorporation, and alignment of research objectives with practical applications.

- **Maintenance and Upkeep:**

    Software Maintenance: Regular updates and maintenance of software tools (ANSYS Fluent, Dartfish, Python, Tableau) ensure optimal performance and compatibility with evolving research needs.

    Equipment Maintenance: Maintenance of motion capture systems, computing infrastructure, and experimental setups is crucial to ensuring uninterrupted operations and reliable data acquisition.

- **Continuous Improvement and Innovation:**

    Training and Development: Continuous training programs ensure that researchers and staff are proficient in using advanced software tools and methodologies. This fosters a culture of learning and innovation within the laboratory.

Innovation Projects: The laboratory initiates and participates in innovation projects aimed at developing new methodologies, algorithms, and technologies to advance sports science and engineering.

Beneficiaries:

- Teams and Coaches get benefited.
- Ph.D., Researchers involved in the field of Sports Technology.
- Engineers who are pursuing their masters (M.Tech., in Sports Technology).
- Athletes get benefited in achieving their performance improvement.

Overall Outcome:

The overall outcomes stemming from the Computational Sports Technology Laboratory encompass a profound impact on sports science, engineering, and performance enhancement. Through rigorous aerodynamic analyses using ANSYS Fluent, motion assessments with Dartfish, and advanced data analytics using Python, and Tableau, the laboratory consistently drives innovation in sports equipment design and athlete training methodologies. These efforts lead to optimized sports gear that enhances performance, improves athlete safety through injury prevention strategies, and fosters continuous advancements in sports technology. Research conducted in the laboratory contributes to academic publications, informs regulatory standards, and supports the development of sustainable sports equipment solutions. By achieving these outcomes, the laboratory not only elevates athletic performance but also strengthens the global sports community by setting new standards in research-driven innovation and technological advancement.

Conclusion:

In conclusion, the Computational Sports Technology Laboratory stands as a cornerstone of innovation and advancement in sports science and engineering. Through its sophisticated use of ANSYS Fluent, Dartfish, Python, and Tableau, the laboratory drives significant improvements in athlete performance, equipment design, and safety protocols. By leveraging cutting-edge technology and conducting rigorous research, the laboratory not only enhances the capabilities of athletes and sports teams but also contributes valuable insights to the broader fields of biomechanics and aerodynamics. The outcomes from this facility pave the way for sustainable innovations in sports equipment and methodologies, shaping the future of sports technology and ensuring that athletes worldwide have access to the tools they need to achieve peak performance.

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TAMILNADU PHYSICAL EDUCATION AND SPORTS UNIVERSITY
CHENNAI- 600127
(Estd. by the Govt. of Tamil Nadu Under Act No.9 of 2005. A State Govt. University)
Accredited with "B++" Grade by NAAC

DEPARTMENT OF EXERCISE PHYSIOLOGY&BIOMECHANICS

Exercise Physiology and Nutition Laboratories

PURPOSE/OBJECTIVES

The exercise physiology and nutrition program allow the students emphasizes on understanding the determinants of physical activity and energy expenditure, adaptations to exercise that impact human work performance and disease risk, and exercise metabolism and nutrition. This program is also designed to provide a depth knowledge provides our students with a comprehensive foundation in both Exercise Physiology and Sports Nutrition based on the most current research evidence, alongside a practical environment where they can apply nutrition principles and interactions between diet, exercise and health.

SIGNIFICANCE

- To develop in-depth knowledge and practical skill sets to ensure a scientific basis to Exercise Physiology and sports nutrition.

- To plan and implement sport-specific nutrition support to Indian athletes/ sportsperson's and Special population.

- To develop a team approach, display adequate team building, and soft skills, to facilitate the implementation and monitoring of sport-specific nutrition support.

- To develop research, scholarly skills and specific skills needed for entrepreneurship or gain job experience to improve employability.

- To develop day-to-day requirements of athletes, critical analysis and problem-solving within a team, with specific reference to providing support to elite athletes during training and during national and international events.

- To design and implement exercise and nutrition programs for the public in weight control centers, work sites, fitness centers, community centers, healthcare settings, and private practice.

LABORATORY FACILITIES

Cardiovascular and pulmonary fitness can have considerable influence on the potential for successful performance in a variety of sports and athletic competitions that involve aerobic and anaerobic energy system.

CARDIOPULMONARY AND METABOLIC ASSESSMENT

- During diagnostic and functional capacity testing, the levels of oxygen consumption attained at different workloads or at maximal effort exercise can be used to evaluate health and performance and develop individualized exercise prescriptions.

- The level of oxygen consumption at maximal effort exercise (VO_2max) is often called cardiorespiratory fitness and is a strong predictor of the performance during aerobic endurance sports and competitions.

BIOELECTRIC IMPEDANCE

- Bioelectric impedance analyzers can be used to measure body composition.
- Electric currents travel faster in body tissues that have a higher water and electrolyte content than in those tissues with a lower water and electrolyte content.
- The speed at which the current passes through the body can be used to determine the percentages of lean tissue and fat tissue in the body.

BLOOD PRESSURE ASSESSMENT

- The measurement of systolic and diastolic blood pressures is a commonly performed procedure that allows for the diagnosis of hypertension.
- To provides an important assessment of the workload of the heart at rest and during physical activity or exercise.

STRENGTH TRAINING

- Resistance training methods improve strength, power, or muscular endurance.
- The area of fitness developed is determined by the resistance, repetitions, and sets performed.
- Resistance training can be performed using dumbbells, barbells, resistance machines, pulleys, body weight or equipment such as kettlebells, resistance bands, or sandbags.
- A performer completes a specific number of repetitions and sets depending on their goals.
- The intensity of weight training is calculated by working out the one max rep. This is the amount one can lift for just one repetition. Then work at a percentage of the one max rep.

STADIOMETER

Standing height and body weight provide standard physical measures of the client or athlete.

ASSESSING FLEXIBILITY

- Flexibility is assessed in several ways; there is no single test to assess flexibility because it is not a single general characteristic of the body. The most common test for flexibility is the sit-and-reach test, which primarily reflects the range of motion of the hamstrings.

ROWING MACHINE

- Rowing machines are frequently used to test athletes in sport performance assessment settings.
- To evaluate peak power, and the coach or fitness professional should verify that a relative plateau in power output has been achieved during the assessment.

DIET COUNSELING

- The diet counselling begins by conducting an assessment of the individual's current dietary habits, health status, medical history, lifestyle, and specific nutritional needs.

- Based on the assessment, the student works with the individual to establish realistic and personalized goals.

FUTURE PLAN OF THE DEPARTMENT:

- Value added courses, entrepreneurship and skill development program to be started with a view to enhance employability and holistic development of students.

- New programs to be introduced in the regular curriculum.

- Short term courses to be conducted in collaboration with SAI and SDAT for the benefit of students.

- To make sports sciences more applicable to the athletes in a practical way.

- Creating a unique model of inclusive sports education and recreation for differently abled athletes and to mobilize the differently able to a suitable environment.

- Faculty development programs and short-term course related to sports sciences to be conducted by the university.
- Organization of various seminars/workshops on use of ICT in quality teaching learning and research methodology for quality research work.
- Alumni network to be strengthen for student support system.
- Regular updating of course syllabus has to be done.
- Faculties and students to be encouraged to take up minor and major projects.
- To promote quality research and undertake research projects keeping in view their relevance to needs and requirements in local industry.

SUMMARY

- The Department of Exercise Physiology and Biomechanics seeks to promote the health, fitness through research, and prepare students for professional roles in promoting optimum health and wellness of individuals and diverse communication through the application and integration of exercise physiology and Sports Nutrition, dietetics.
- To conduct advanced research in areas related to clinical sports nutrition and exercise physiology and mentor junior researchers who will become future thought leaders in the fields.

TAMIL NADU PHYSICAL EDUCATION AND SPORTS UNIVERSITY

SPORTS PSYCHOLOGY LABORATORY

Introduction:

The Sport Psychology Lab of the Tamil Nadu Physical Education and Sports University was established in the academic year 2017-2018, funded by a project from the Sports Science Centre under Tamil Nadu Innovative Initiatives Scheme of Government of Tamil Nadu. This lab is significant for its seamless blend of theoretical knowledge and practical application, offering students and scholars invaluable hands-on experience. By focusing on the psychological aspects of athlete participation and performance, the lab enhances the understanding and practical application of sports psychology principles in a meaningful way. The lab is equipped with advanced machines and equipment, including, Sports Vision Trainer with a 32-sensor pad (SVT™ Professional software), EMG Biofeedback Trainer. The primary beneficiaries of this lab are students, scholars/researchers, athletes, coaches, and sports science professionals. Athletes, in particular, receive specialized counselling and support to optimize their psychological preparation and performance in sports competitions. The hands-on learning opportunities in Sports Psychology lab simplify complex theories and concepts, making them more accessible to students. By actively engaging with the tools and apparatus, students not only deepen their understanding but also develop a heightened interest in the subject matter throughout their education.

FACILITIES OF SPORTS PSYCHOLOGY LABORATORY
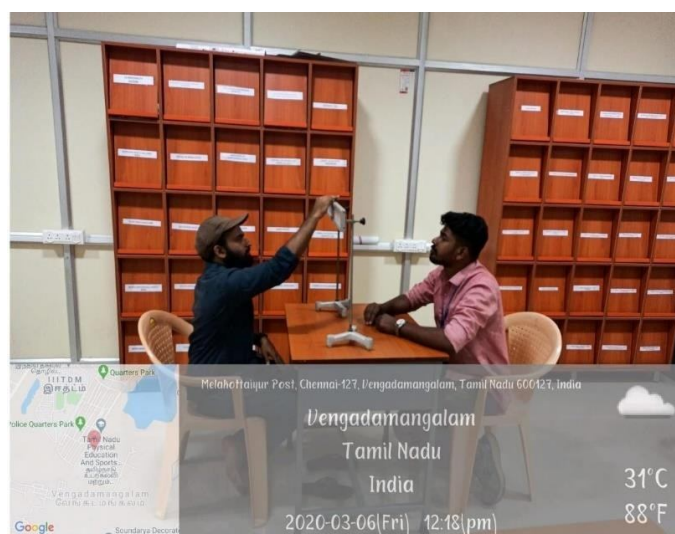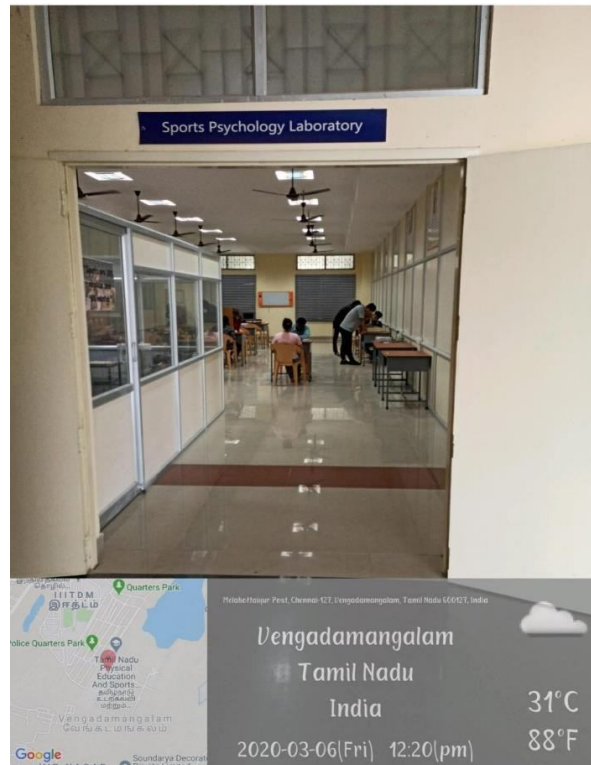
Sports Vision Trainer (SVT)   **EMG Biofeedback Trainer**

Annual Audit Committee Visit

Hon'ble Minister Thiru.Udhayanidhi Stalin Visit

Operations of the Laboratory:

Sports Vision Trainer (32 sensor pad SVT™) SVT Professional software. Compatible with existing SVT datasets, the Professional series of software allows you to graphically visualise, track and compare test results with ease. Leveraging the power of DSP (Digital Signal Processing), SVT Professional can visually show

trends in data by pooling information from test results in spatial, frequency and time domains.

Beneficiaries:

The beneficiaries of this Sport Psychology Lab include:

- **Students:** Gain practical experience in applying theoretical knowledge to real-world scenarios, enhancing their learning and skill development.
- **Scholars/Researchers:** Conduct research and studies to advance understanding of psychological factors influencing athletic performance.
- **Athletes:** Receive specialized counseling and support to optimize their psychological preparation and performance in sports competitions.
- **Coaches:** Access resources and insights to enhance coaching strategies and support athletes' psychological development.
- **Sports Science Professionals:** Collaborate on interdisciplinary projects and gain insights into the intersection of sports science and psychology.

Overall Outcome:

Overall, the hands-on learning opportunities in this lab simplify complex theories and concepts, making them more accessible to students. By actively engaging with the tools and apparatus, students not only deepen their understanding but also develop a heightened interest in the subject matter throughout their education. This practical approach fosters a more comprehensive grasp of theoretical concepts and prepares students effectively for applying their knowledge in real-world settings.

Conclusion:

In conclusion, the Sports Psychology Lab is committed to advancing research, practical application, and educating the students, scholars, and athletes alike. Currently equipped with advanced tools, future plans include acquiring cutting-edge equipment such as VTS and eye trackers to further enhance learning and research opportunities for students and young researchers.

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