Sports Engineering

Dr. K. Jothi Dayanandan
Associate Professor,
YMCA College of Physical Education, Chennai

NEED, PURPOSE AND ADVANTAGES OF Sports Engineering

Sports engineers are typically involved in the following activities:

- **Equipment design**: designing and building new equipment based on the requirements of athletes. *e.g. racing wheelchair design*.
- **Lab experiments and testing**: measuring the behaviour of equipment, athletes and their interaction in a controlled environment. *e.g. measuring football boot traction*

- **Computational modelling:** Simulating the forces acting on athletes and their equipment (Finite Element Analysis) or simulating the airflow around equipment (Computational Fluid Dynamics). *e.g. football aerodynamic analysis*
- **Field testing:** recording the behaviour of sports equipment in a match environment. *e.g. high-speed video recording of tennis players hitting the ball*
- **Working with governing bodies**: assessing the effects of rule changes or understanding injury risks.
- **Working with athletes**: working together to improve their performance.

What do Sports Engineers Do?

- Sports Engineers design and engineer sports equipment and facilities, training equipment, sports clothing, rehabilitation facilities used by sportspersons, orthopaedic appliances and high-performance human-machine systems.

Sports Engineering

- **Sports Engineering or Technology** is a field of engineering that involves the design, development and testing of sports equipment.
- The equipment used by athletes has always gone through technological design and development based on current knowledge and understanding

- Sports engineering only became official in 1998 when the Sports Engineering Research Group and the International Sports Engineering Association were formed at the University of Sheffield.

- Since then, the field has grown immensely and now involves many universities, sports companies, regulatory bodies and sports clubs across the world.

Possible Examples

- Development of advanced bicycles, shoes, wheelchairs, etc
- Analysis of the mechanics of tennis ball flight and bounce
- Optimisation of a racing yacht hull and rig
- Development of new sports court surfaces to improve performance and reduce injuries
- Optimisation of foot placement to improve kicking accuracy in soccer
- Application of damping technology in tennis rackets

- Development of force logging systems for rowing boats
- Improved suspension systems for Formula 1 racing cars
- Use of computational fluid dynamics to analyse swimming strokes and modify technique for faster times
- Improvement of orthopaedic aids for injured or disabled athletes

- Development of high performance surf boards, kite surfers and sails

- Development of high performance paragliders and hang gliders

- Development of high-performance human-machine interfaces for defense applications

Where do Sports Engineers Work?

Graduates can work in both the sporting and engineering industries nationally and internationally, including:

- Sports organisations and elite sporting institutes
- Sports equipment manufacturing companies
- Sports clothing manufacturing companies

- Architecture and sports facility design companies
- Orthopaedic product companies
- Defence organizations and industries
- Industrial design consultants

Why Study Sports Engineering?

- In the past, sports engineering problems have been tackled by either engineers or physiologists, or multidisciplinary teams.
- The lack of personnel with multidisciplinary skills limits progress.
- The Sports Engineering program seeks to provide graduates with an appropriate breadth and depth of skills so that they can contribute to and lead such multidisciplinary teams.

- Students receive training in the fundamentals of engineering and biological sciences, and then apply these fundamentals to the study of sports-related systems.

- Graduates will have both mechanical engineering skills and highly specific sporting engineering skills giving a wide range of potential career opportunities.

What will you learn?

- Sports engineering is a program that recognises the interdisciplinary nature of high-performance sporting equipment, facility design and sports performance.
- The program combines the core of Mechanical Engineering science, technology, design and management, with the fundamentals of physiology and biomechanics and then integrates these areas in a range of sports-related subjects.

The multi-disciplinary structure of sports engineering includes courses that cover

- Computing
- Sports
- Physiology
- Professional Practice
- Design
- Mathematics
- Electronics
- Engineering Science

Engineering Simulation Solutions for the Sport Industry

- Engineering simulation solutions from ANSYS have been chosen by leading sports equipment manufacturers to help improve various equipment designs for:
- **Bicycle components**
- **Fitness equipment**
- **Surfboard**
- **Canoe design**
- **Football protection**
- **Skis**

THANK YOU