



Title or subject of the project	Breaking the High Load – Bad Coordination Multiplier in Overhead Sports Injuries (Tennis)
Open to students from	<ul style="list-style-type: none"> • Master Biomechanical Design (ME-BMD) • Master BioMedical Engineering (BME)
Key words	Tennis, Serve, Forehand, Timing, Kinetic Chain, Electromyography
First examiner	Name: Dirkjan Veeger E-mail: h.e.j.veeger@tudelft.nl
Daily supervisor (Mail for more information)	Name: Bart van Trigt Institute: TU Delft, department Biomechanical Engineering E-mail: b.vantrigt@tudelft.nl
Location of the project	TU Delft (measurements may be performed elsewhere, but still needs to be determined)
Background/context of the project	Shoulder and elbow injuries are common in (elite) youth athletes participating in overhead sports, for example in the tennis serve. Serving a ball is a highly coordinated whole-body motions requiring transfer of kinetic energy from the lower extremities, pelvis and trunk to the upper extremity. This sequential transfer of energy between body segments is referred to as the kinetic chain. The relative timing of muscle activity generates the sequential transfer of energy from the proximal to the distal segments in the kinetic chain. Motions out of sequence lead to deficiencies in the kinetic chain wherein segments further in the chain may accommodate for the loss of energy, which might be associated with an increased risk for shoulder or elbow injuries.
Aims of the project (research questions)	<p>The aim of this research project is twofold: (1) to gain insight of the intersegmental coordination and muscle activation patterns of the arm of tennis players and (2) the effect of disturbances in the kinetic chain on the musculoskeletal load of the upper extremity (e.g. elbow and shoulder).</p> <p>Nevertheless, master students are required to formulate their own exact research question more or less related to the aim of the project.</p>
Skills required	Good knowledge of biomechanics, multibody dynamics, and/or electromyography, data analysis using MATLAB or python and statistical analysis (linear regression analysis) using SPSS or R.

