



CALIFORNIA STATE SCIENCE FAIR 2016 PROJECT SUMMARY

Name(s) Sanjeev P. Thurgam	Project Number 36336
Project Title Teaching Tennis to Beginners through the Aid of a Hand Device	
Abstract Objectives/Goals In this project, I am designing a mechanism/device whose purpose is to help tennis players learn how to create/generate topspin in their shots. In tennis, topspin is vital to a good player's game, increasing consistency, margin of error, and power, but is extremely hard to master. The design criteria of my device is for it to be comfortable, light, visually appealing, safe, and to ultimately be successful in generating topspin, and to improve the player's shot. Methods/Materials At a glance, the device uses a programmable NXT Mindstorms servo motor, programmed through proprietary NXT software, connected to axles, bound to a simpson tie cinched at 27 degrees, the angle of pronation, that fits into a carpal tunnel wrist stabilizer, with the trigger as a NXT Touch Sensor. When the motor's program activates via contact by the Touch Sensor, the rotation allows for the wrist to spin and curve over the ball, generating topspin in the shot. The device was tested by operating while the subject hit a series of shots. A problem with the project is that topspin exerted on the ball, cannot be quantified as numeric, visual, or any specific or definite data. Instead, I tested for direction of movement on the arm, and degrees rotated on the arm, along with conducting surveys and getting generalized observations of the subject's performances and opinion. Results After conducting tests, assuming a western grip, my device averaged 43 degrees back and 40 degrees forward, and was observed that the general push of the device was usually enough to lead the subject into the actual motion, most of the time. Though too weak for the initial level of force envisioned, the degrees generated, along with surveys and observations of the subjects who tested it, proved that the device does perform the motion needed to generate topspin. Conclusions/Discussion With the use of the NXT programmable brick, or any other programmable software, the device can be developed to teach the subject all sorts of strokes, including slices, serves, etc. This device mainly focuses on programmable forearm rotation, allowing for this device to be transferable to aid in the teaching of other sports as well, including forearm rotation in football, baseball, etc, based off of the principle and concept demonstrated by this device.	
Summary Statement I created a prototype that helps tennis players learn how to generate topspin in their shots, and can aid in other wrist-related sports.	
Help Received Jim Swansiger- Director of Tennis at Castlewood, gave me access to tennis players who could test my device	