HeadSentry: An Innovative Real Time System for Preventing Second Impact Syndrome (SIS) from an Overlooked Concussion in Aquatic Sports

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Concussions and other head injuries are very common in a wide variety of contact sports. However, a concussion that goes undetected can be severely life threatening to athletes through what is known as Second Impact Syndrome (SIS). As a result, this research project presents HeadSentry, a real-time monitoring system that can help identify whether an athlete has suffered an impact that could potentially cause a concussion, and initially focuses on the sport of water polo. This project employed a multifaceted approach through the following steps. First, an online survey was conducted to substantiate the need for more effective concussion detection in water polo. Next, the biomechanics of concussions were investigated. Then, a sensor using accelerometers was constructed into existing water polo caps to measure the acceleration of a head during an impact. Tests were conducted using a crash test dummy head and neck system to measure the severity of ball impacts. It was found that impacts towards the front of the head were more dangerous than towards the side and that reducing the air pressure of the water polo ball could potentially reduce the prevalence of concussions. Lastly, a real-time monitoring system and web application was developed to notify coaches when a player is struck, identify potential symptoms, and propose diagnostic tests based on the direction and severity of the hit. As HeadSentry continues through the development process, it will expand into a more elaborate concussion detection and diagnostic system to revolutionize player safety in a multitude of sports.

Awards Won:
Fourth Award of $500