## **Thesis Portfolio**

### The SmartBell

(Technical Report)

#### Insight into Major League Baseball's History with Anabolic Steroids (STS Research Paper)

An Undergraduate Thesis Presented to

The Faculty of the School of Engineering and Applied Science University of Virginia

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# INSIGHT INTO MAJOR LEAGUE BASEBALL'S HISTORY WITH ANABOLIC STEROIDS STS advisor: Kent Wayland, Department of Engineering and Society

PROSPECTUS Technical advisor: Harry Powell, Department of Electrical Engineering STS advisor: Kent Wayland, Department of Engineering and Society It's human nature to improve oneself. No one wants to be stagnant in their progress or be on a decline. The same mindset is evident in athletics. The weightlifter wants to be able to lift more the next go around, the track athlete wants to be faster, and the baseball player wants to hit more hum runs. The question that needs to be answered is, what factors are considered when deeming if a method of athletic improvement is "fair" or "unfair"? It's an important question of which the athlete will be remembered as a cheat or one of the greatest of all time. No athlete wants to achieve glory for their success, and then have it ripped from them being labeled as a cheat. Neither do they want an asterisk, signifying a "yes, but" situation next to their record. That is why it is important to know which methods of improvement are fair game and which are, or may later be, considered unfair.

The technical project associated with this overarching topic was creating a new workout attachment that would aid weightlifters during their lift. The project completed was called The SmartBell. It is a small device that is attached to a barbell which counts reps completed, calories burned, and rest time between sets. The project was created to get hands on experience on what goes into the innovation process of creating a performance enhancing workout device. The creation of The SmartBell took many iterations of getting a small enough printed circuit board (PCB) and many long nights getting all the separate hardware components interacting with each other. There were many times the project team had to take trips over to WWW, an electronics company, in Charlottesville to solder on small hardware components onto the PCB since team members did not have the necessary skills or equipment. After writing correct software to interact with the hardware side, the results of the project were exactly what the group was hoping for. The SmartBell had the capabilities mentioned above that would aid a weightlifter on his or her workout. The project, interestingly enough, allowed the

team to realize and experience the business side of innovation in sports technology. There is a large demand to get the most efficient workout and many innovators realize this, and try to take a piece of the market. It just so happens that if an innovation causes exponential improvement (like steroids) to an athlete, there will be eyebrows raised and legal questions asked.

The STS research paper attempts to answer the question on what power dynamics are in play when determining if a method of athletic improvement is considered "fair" or "unfair". It mentions the quick turnaround in rule change that occurred after Eliud Kipchoge showcased his new running shoes in the Ineos 1:59 Challenge breaking the 2-hour marathon barrier. Along that same vein, it mentions the quick rule change on full body swimsuits after its showcase in the 2008 Beijing Olympics. The bulk of the paper focuses on two case studies dealing with Major League Baseball (MLB): The single season home run race between Mark Mcgwire v. Sammy Sosa and Barry Bonds infamous BALCO scandal. These MLB cases were chosen to analyze as the MLB has a rocky relationship with anabolic steroid use. The paper goes on to note the big players in deciding what is considered legal and illegal in athletic improvement are the US Government, ruling sports agency, and the public. The group with the most power and influence is the US Government. However, when the ruling sports agency disagrees with the US Government, it comes down to the public perception of the method of athletic improvement. This however can be wishy-washy as public perception changes over time.

The technical and the research projects completed throughout this year have both given a good segue into studying the overarching topic of athletic self-improvement. The technical project dealt with how new technologies have been making their way into the market. It learned more heavily on the creation side of these new technologies. The research project used two case studies to analyze the different organizations or groups that determine if these new self-

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improvement technologies should be legal or illegal. The discussion touches upon the how these organizations determine whether rules should be made to restrict or enable these new technologies. Together, these two projects give more information on how new inventions for self-improvement are created and what the process if like to determine if they are considered moral.