ripTQ: Democratizing Extremity Bleeding Control With an Inexpensive Automatic Tourniquet

Kweskin, Sam (School: Eleanor Roosevelt High School)

Bleeding poses as the most serious cause of death in traumatic injury. Whenever someone is bleeding from one of their limbs, a tourniquet (TQ) is vital for stopping hemorrhage. TQs work by tightening around a limb and keep blood from exiting through a wound. Without a TQ applied immediately after severe injury, victims face an exponentially greater chance of death. Every current modern TQ relies on the user to be skilled and know exactly where and how to stop a bleed. Significant training therefore is required to properly operate modern tourniquets. To fix this, I have designed a tourniquet that can be operated without the previous training required by the industry standard TQ, the Combat Application Tourniquet (Cat-7). My TQ design, ripTQ is completely automatic after it is placed on a bleeding limb and a red ripcord is pulled. A servo motor controlled by an Esp32 microcontroller automatically tightens stopping bleeding. My testing apparatus consists of a blood pressure cuff wrapped around a 4in wide rigid plastic water bottle. My experimental TQs were the Cat-7, my first automatic TQ iteration, and ripTQ. I measured the maximum pressure each TQ exerted on my testing apparatus. ripTQ demonstrated a 10.9% increase in pressure compared to the Cat-7 TQ partially supporting my hypothesis of a 25% increase in performance. RipTQ has broad lifesaving potential in schools, remote areas, underserved regions, and in public spaces.

Awards Won: