

## Abstract

### **Title: Enhancing CPR Training: Development and Assessment of an Affordable, Open-Source Real-Time Feedback Manikin**

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Cardiopulmonary Resuscitation (CPR) is a life-saving technique used in cases of cardiac arrest. Immediate CPR can increase survival rates two to three-fold. While many CPR training courses use non-electronic CPR manikins, recent literature has shown that training on a real-time feedback CPR manikin improves functional outcomes such as chest compression rate and mean tidal volume. However, current commercially available real-time feedback manikins only measure metrics on chest compressions or can be prohibitively expensive (>\$200). Accordingly, we have designed, constructed, and tested a low-cost Arduino microcontroller-based CPR manikin that provides real-time feedback to trainees on eight critical metrics including force of compressions, rate of compressions, percentage of full chest recoils, hands-off time, angle of head tilt, pinching of the nose, ventilation volume, and ventilation rate. Visual and auditory feedback on these metrics is delivered to trainees, allowing them to adjust their performance in real time. Additionally, data from each training session is saved and assigned to a user profile, so that multiple trainees can review their progress throughout their training. The manikin is open-source, allowing any interested party to reconstruct the manikin for under \$100. A randomized, double-blinded study is currently underway, comparing the efficacy of training on this manikin with another leading market competitor (Little Anne QCPR, \$249) and with a non-real time feedback manikin (Nasco Basic Buddy, \$107). Participants are assessed on quality of CPR based on nine key metrics including effective compressions and hands-off time.