

# Incorporating a Micro Embedded Optical Heart Rate Sensor to Wirelessly Monitor ER Patients' Biomarkers

Nunez, Ashley (School: James Pace High School)

The key to performing well in an emergency room is accurate and quick triage. Therefore, the functions of technology that are related to healthcare should be examined, as they are very helpful for the ongoing monitoring of biological data. The purpose of this project is to create a healthcare device used to monitor vital signs. There were two experimental designs: prototype A and prototype B. Test 1 was building the circuit on the Arduino and breadboard. Both prototypes were successful in this test. However, in test 2, which included the programming of the code and verification, only prototype B was successful. This was due to prototype A's code not being verified. Once this issue was fixed, a second trial was run, and the code was verified. For test 3, the 3D printing of the exoskeleton of the device, both prototypes required two components. These components were sketched and printed successfully for both prototypes. Lastly, test 4 consisted of five trials. All five trials tested for accurate vital sign readings. In experimental design 1, the first two trials were 88% accurate, and the last three trials were 94% accurate. In experimental design 2, the first two trials were 96% accurate, and the last three trials were 99% accurate. The engineering goal was met; a healthcare device outfitted with biomarker sensors was designed and built successfully. This is significant because patient biomarkers change all the time, and this device will assist triage nurses in collecting the vital signs of emergency room patients.