Designing and Testing a Complementary 3D Exoskeleton Monitoring System for Patients With Mobility Challenges

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The conventional method for treating fractures with plaster or fiberglass casts often faces issues, such as discomfort, and skin problems (Lin et al., 2016). These conventional casts have long faced challenges and are being replaced by innovative solutions, such as 3D-printed casts with monitoring sensors, making them a far more functional option (Sankar et al., 2018). Recognizing the importance of continuous monitoring in the healing process, the researchers complemented a 3D printed cast, with sensors that measured pressure, humidity, and temperature to determine any problems that might present during the recovery of the patient with mobility challenges. The researchers aimed to design, assemble, and test the effectiveness of a complementary 3D exoskeleton monitoring system using an Arduino UNO. This study encompassed three phases: coding, development and testing the cast prototype. Through rigorous testing and validations, the researchers' concluded that the complementary 3D exoskeleton monitoring system can efficiently measure pressure, humidity, and temperature in a cast to determine any problems present during the recovery of the patient with mobility challenges. The 3-D Cast facilitated real-time monitoring and simplified data management via Bluetooth connectivity to mobile devices that enriched comprehension; this will also help enable prompt assistance. Future efforts will focus on refining the prototype for compactness, lightweight design, and waterproofing, to enhance comfort and functionality in diverse settings. This will be followed by the potential integration of an inner antibacterial sleeve for the cast, infused with a beetroot compound and testing its efficacy against bacterial colonies.