Mitigation of Pressure Injuries Utilizing an Inertial Wearable, Computer Vision, and Machine Learning

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Pressure ulcers, or pressure injuries (PIs), are localized areas of the skin and/or underlying tissue decay that typically occur over bony prominences due to prolonged pressure or friction. These ulcers can range from a pink spot on the skin to exposed bone and tissue. If they occur, PIs can lead to serious morbidity and mortality, emphasizing the need for prevention. Certain predispositions, such as poor circulation or malnutrition, can lead to faster progression and/or increased severity of the ulcers. PIs are reported in 10-30% of healthcare patients, making them one of the largest concerns in the field. To ensure the prevention of ulcers, it is suggested that a patient is rotated at least every 4 hours. This research utilizes a database of demographic and clinical features of a large patient data set and data analysis and machine learning to determine the higher risk predispositions and build devices to assist in the prevention of PIs. Two complementary monitoring systems are built utilizing the information acquired from the database and are based on the patient's position in a hospital bed. The first device is a non-invasive camera monitoring system, and the second device is an inertial wearable system utilizing an inexpensive microcontroller and gyroscope/accelerometer collecting vector data. Machine learning is applied to the data gathered by the inertial wearable and the camera monitoring system, linking the time a patient has not turned and alerting to the need to reposition the patient to relieve pressure points.

Awards Won:
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