The Morris Orthotic: A Smart Orthotic for Diabetic Patients

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My project proved that it is possible to identify peak plantar pressure using wearable pressure sensors built into a custom foot orthotic with the idea that the orthotic could proactively signal to the foot doctor when and where to adjust the orthotic to prevent ulceration. The device is a plantar pressure reading diabetic foot orthotic that with comparatively inexpensive sensors and an onboard arduino is able to detect peak plantar pressure in diabetic patients. Peak plantar pressure, especially in conjunction with peripheral neuropathy, often leads to ulceration of the foot. Diabetic foot ulcers (DFUs) are quite serious because they often lead to amputation. Mortality among patients with foot amputations is alarmingly high. This problem is a major public health issue. Currently, doctors rely on the patient to check for red spots and ulceration and to come in for routine exams to confirm that their diabetic orthotics are properly unloading peak pressure. This is ineffective because often times patients are not sufficiently diligent in their self-inspection and do not notice problem areas until it is too late. My medical device has pressure sensors built in and the data collected is able to tell the patient and the doctor if the device is no longer eliminating peak pressure. The orthotic could proactively signal to the foot doctor when and where to adjust the orthotic to prevent ulceration, thus reducing amputations and attendant mortality. This will greatly improve the health and well being of millions of patients and reduce the burden and cost on the health care system because the preventative treatment is a much lower cost than the price of DFU care.

Awards Won: