Musculoskeletal disorders associated with repetitive and forceful motions of the hands and wrists have been reported as the largest contributor of workers compensation costs excluding the costs associated with work related injuries of the back. Carpal tunnel syndrome (CTS) is a combination of symptoms resulting from the impingement of median nerve that supplies sensation and motor control to thumb, index finger, and middle finger. Improvements in the posture of the hands and wrists along with regular and frequent rest breaks have been shown to help prevent CTS at work. Early detection of CTS has been shown to have a significant impact on reducing the number of cases that reach the level of nerve damage that requires surgery. The aim of this project is to design a portable device for an early detection of CTS via workplace screening. The tests conducted with this portable device can be used to track the nerve condition of employees at fixed intervals of time or to evaluate the impact of particular workstations. If a patient is diagnosed with an altered sensation response, he or she can be asked to undergo more sophisticated and accurate CTS testing techniques such as nerve conduction velocity (NCV) testing and corresponding physician assessment.

The portable vibrotactile threshold tester (PVTT) for workplace screening of CTS uses the vibrotactile threshold (VT) testing method, which determines the smallest amplitude of vibration that can be detected by a subject’s middle finger. Increases in VT have been associated with the progression of CTS. Prolonged and exaggerated flexion of the wrist can cause the VT to increase more dramatically for a symptomatic hand as compared to an asymptomatic hand. Thus, testing subjects at different hand and wrist angles may be useful for determining very small changes in the nerve health corresponding to the changes in VT recorded. The PVTT designed for this project has an ergonomic design with capability of testing subjects at several different wrist flexion angles. The two interval forced choice psychophysical testing protocol will be used. The amplitude, frequency, and displacement of the testing probe can be customized. The subject’s response will also be recorded. A set of asymptomatic subjects will be recruited from the University of Utah student population and another set of symptomatic subjects will be recruited from the School of Music at the University of Utah.