

Good Vibrations

Semi-Finalist

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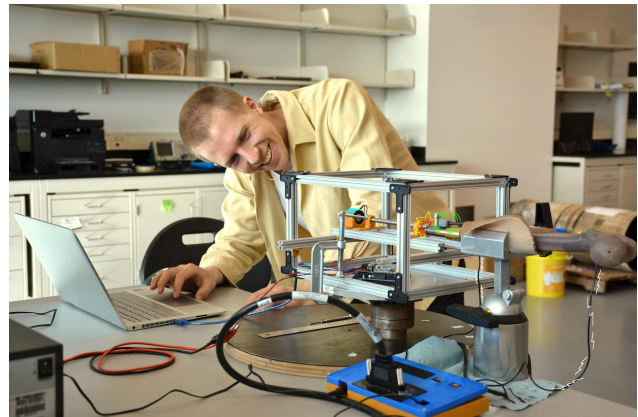


Image Description

This image features myself and my experimental setup. My research centers on the development and testing of a clinical tool for transfemoral osseointegrated implant stability assessment. That's a bit of a mouthful, I know, so I allow me to explain at a high level... An individual with a lower limb amputation may elect to have an implant surgically inserted into their femur. This implant can then interface with a variety of prosthetics. The process by which the implant becomes integrated with the bone is called osseointegration. Osseointegration is characterized by the ingrowth of bone into a porous titanium implant. High quality osseointegration leads to implant stability, which is a desirable outcome. It's my job to contribute to the development of a device that can measure the stability of such implants! The measurement approach my collaborators and I are taking is through linear vibration theory. As seen in the image, we mount an accelerometer (surrounded by illustrated green vibrations) directly on an implant using double-sided tape. An impact rod is propelled by an electromagnet (wrapped in energizing blue current) and strikes the implant at its protruding end. The impact (illustrated by red explosive lines) excites the implant and causes a vibration. The accelerometer records the response and transfers an analog signal (white electricity) to our data acquisition system.