Optical fibre sensor design and development for prosthetic legs

Psychology, Child Development

The prosthetic socket is produced to fit cosily around the residual limb of a person with an amputation. This fit is difficult to achieve and keep up because of capricious changes in extra remaining limb volume and shape. Bits of knowledge into the mechanical connections at the attachment residuum interface can advise configuration however to have been hard to accomplish because of space requirements. An optical fibre-based sensor was created to at the same time measure shear and ordinary stresses the socket residuum interface utilizing various fibre Bragg gratings at various introductions.

The fibres were implanted in a foam which is used as a part of socket manufacture meaning estimation can be performed without changes to the attachment, giving a more genuine account of stresses at the interface. In this sensor, the FBG is inserted such that the connected shear strain is changed as an identical pivotal strain in the implanted fibre. The fundamental sensor configuration comprises of layers of carbon composite material (CCM) and deformable layer with an implanted FBG at a little edge. With this inserting system, a straight variety of the reflected Bragg wavelength move with the connected shear constrain is observed. The point of this examination was to perform benchtop testing on the sensor to survey execution under various loading conditions.

As we know there are bones in legs and over it we pour some optical silicon to make leg shape, so after this we get the prosthetic leg, which is built by a person for getting leg fit in it. When the leg is generated then the sensors are inserted in it to measure the pressure which starts to build up in various

parts of skin. As we know human body is designed in such a way that it cannot handle pressure everywhere except on bottom of leg. Still now there has being no system generated which can measure the different pressure in prosthetic leg. But in our case scenario is different for prosthetic leg. Mechanical testing machine will analyse the various pressure which are getting exerted on leg.

To assess weight and potential change strategies, an overhauled equipment and programming execution is delivered. When you apply compression, the material will expand. With the expansion of material, the fibre expands leading to strain on the axis. This strain is in proportion with the load applied. FBG sensor is at a certain angle and measures a small component of the load. This is the shear strain along that axis. Four FBG sensors are fabricated and sensors receives the data from the load. A sensor is mainly applied between the applied load and the measured load. Thus, we can write MATLAB code based on the theoretical analysis of pressure and shear after receiving output from the sensors.

The investigation of prosthetic leg load appropriation is one of generally perceived clinical significance, however which has several problems such as intact limb pain, Back pain, poor balance, instability or a fear of falling and some time there are socket issues or discomfort. So, all of this issue are need to keep in mind while doing this project because we are going to measure pressure and shear with the help of sensors in build in the prosthetic leg.