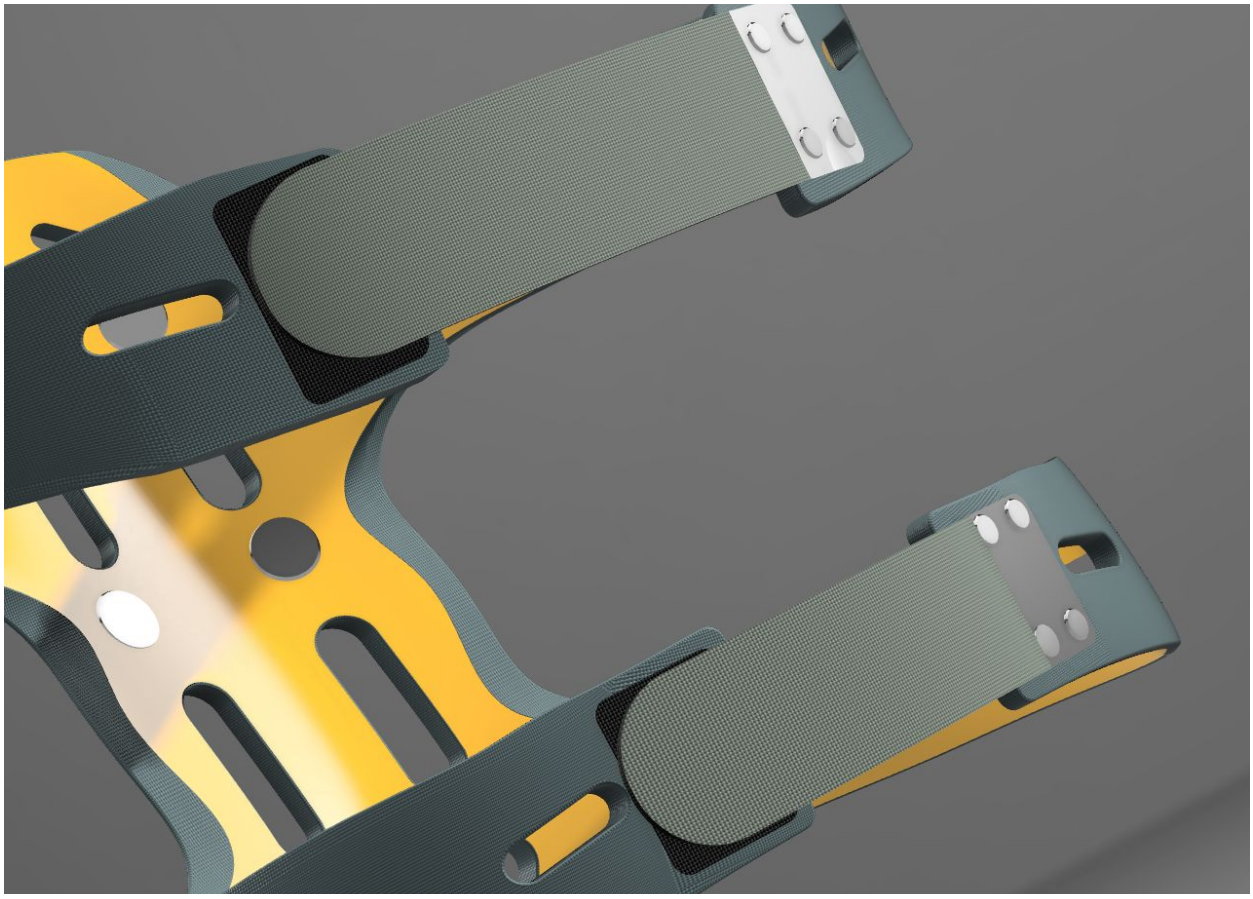
fusion360

SOCIAL IMPACT CHALLENGE



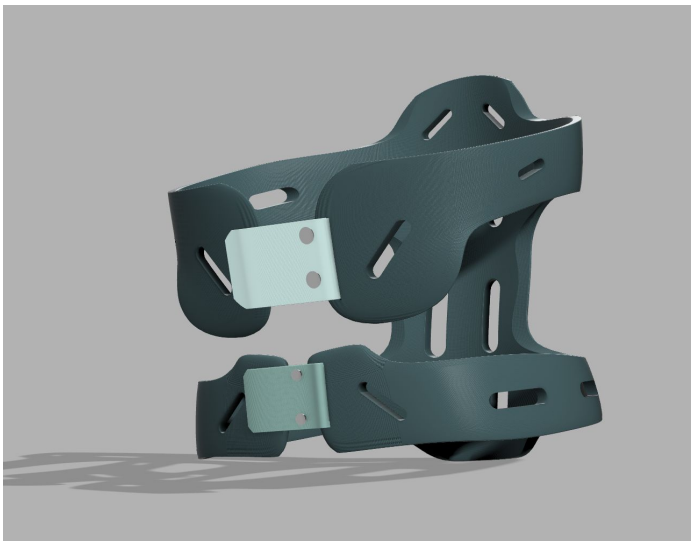
Problem Statement

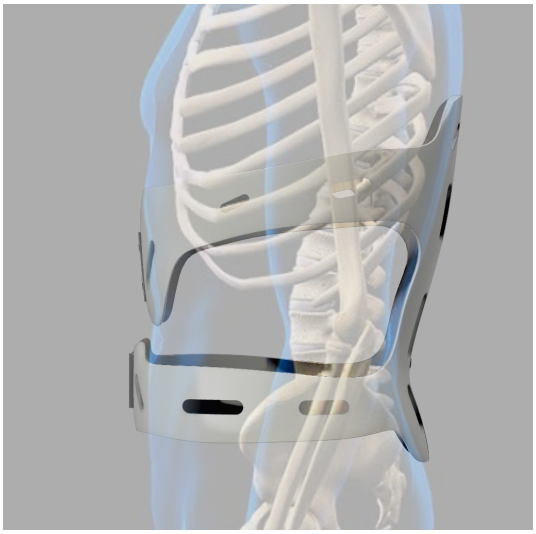
Design an affordable wearable device that helps to correct low back posture.

Back pain is the single leading cause of disability across the World. It prevents millions of people from engaging in work and many other everyday activities. In fact, Worldwide, years lived with disability caused by low back pain have increased by 54% between 1990 and 2015. By designing solutions to the causes of back pain,

such as preventing poor posture while seated, designers can help to reduce the number of people affected by this painful condition.

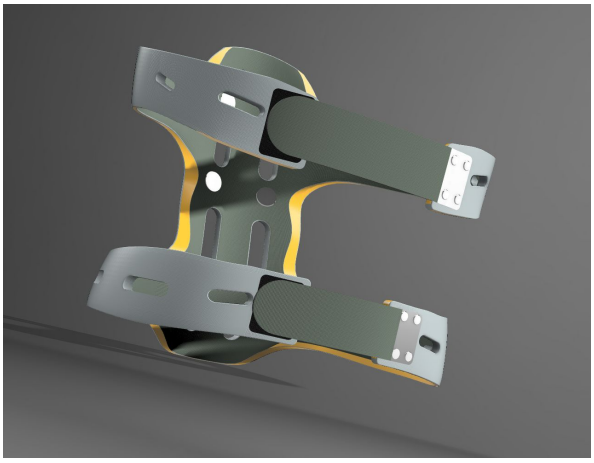
Initial Design

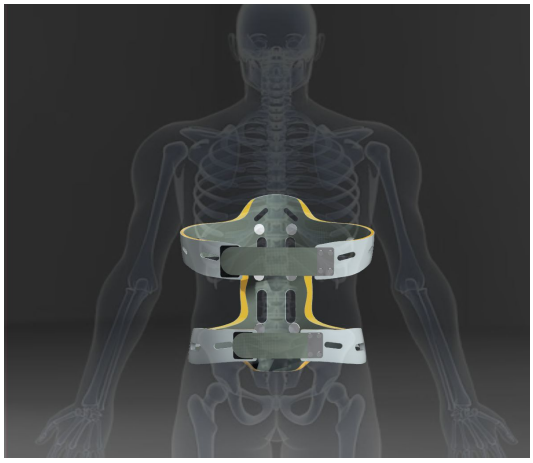




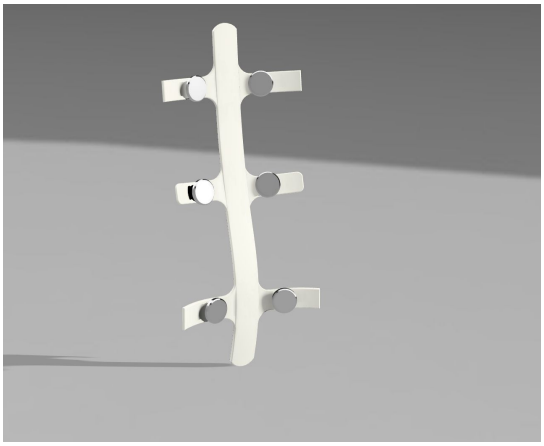
The design idea started with the thought of making a design that keeps the back in the exact shape. But later thought that, nobody likes to get covered in a cage. The initial design had less flexibility and the thickness was a bit more than what was the final aim.

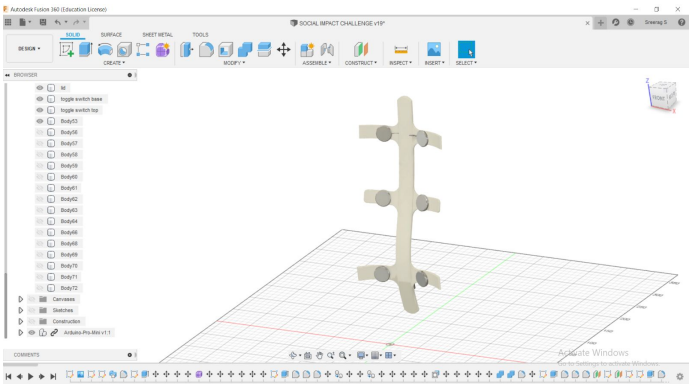
Design Modification





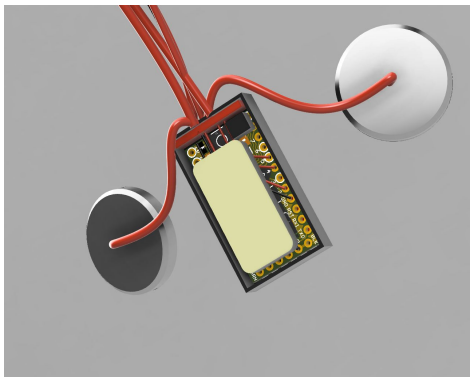
This design is a blend of both mechanical support and electrical vibrators to give the person a massage whenever he wants. The design consists of a back rest inside the fabric covering which acts as the main support for the backbone.

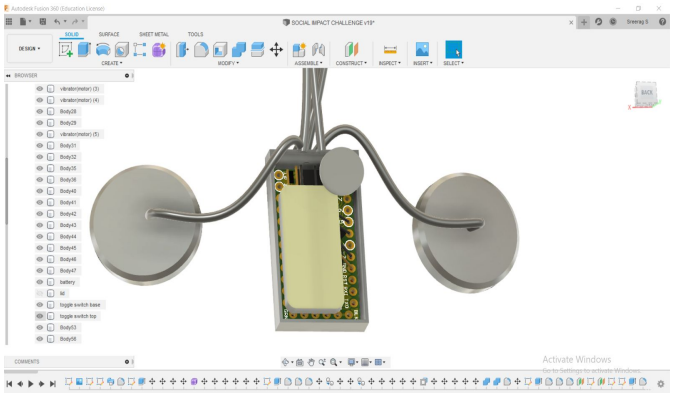




The fabric covering surrounding the body contains this backrest inside it. The backrest can be made using a combination of thermoplastic with a very small amount of elastomer. It is difficult for the user to sit all day steady without any leverage which the user expects. This design helps him to bend down to take an object fallen from the office table with ease. Nobody likes to sit very stiff all day. This design has given the most priority to the user comfort along with reducing his back pain. When the user is not noticing about his poster the stiffness of the thermoplastic helps the user to maintain a good poster and keep the spinal cord or the back bone in the exact shape by providing necessary pressure at the required points. The small amount of elastomer content in the back rest material helps the user to bend his body and get an extension after long hours of work. By selecting the materials that perfectly blend together, they can be injection moulded as the shape shown. The backrest can also be 3D printed but the cost will be high. This shape is made with consideration to place the micro vibration motors. These motors can be vibrated in a sequential way when the user wants it by clicking on a

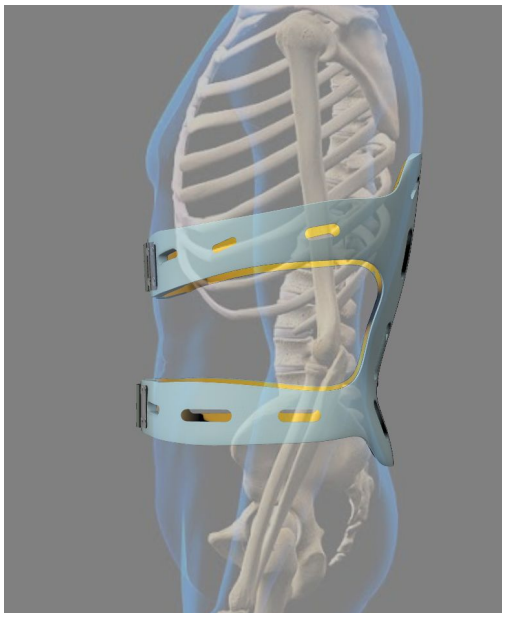
push down switch provided in the back. Each of these small vibrator motors just like the ones in a mobile phone are of low cost and gets the work done.



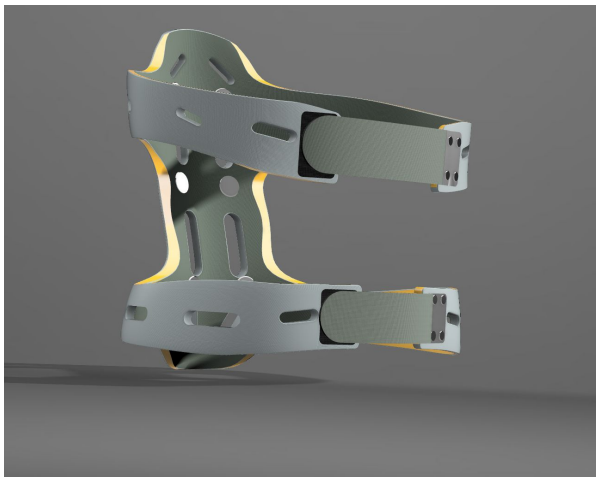


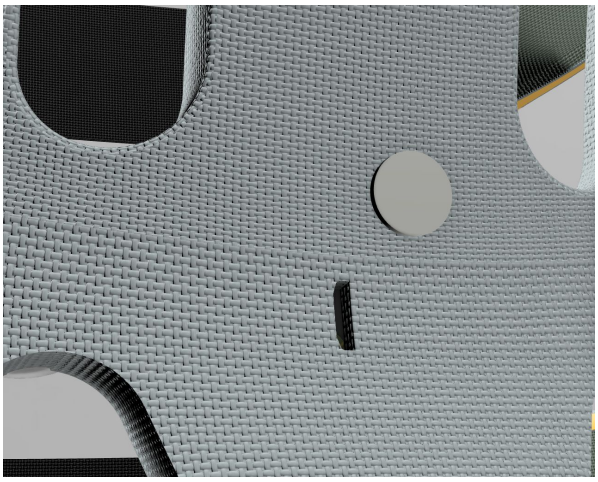
These vibrators are made to vibrate sequentially by connecting them to an Arduino pro mini ATMEGA328P 5V/16M. Using the Arduino mini, we can program the board to make the top two vibrators vibrate first and as they stop the 2 vibrators below it start vibrating. Now as they stop the other ones below it starts vibrating. Now the cycle again repeats. Thus this gives a massaging to the user for about 15seconds to 20seconds time.

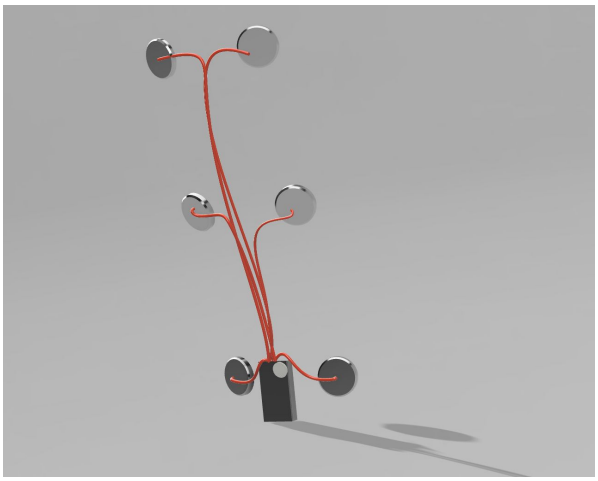
The power is supplied from a small Li-Po battery provided inside the case. A toggle switch is provided for the user to push whenever he wants. All the vibrator motors and circuit box can be fitted to the backrest made of thermoplastic elastomer. Now this can be enclosed inside a breathable fabric and can be stitched together. The breathable fabric along with the holes in design of the wearable device helps in better heat dissipation. Thus the user can continuously wear it during his office time during the long hours of work. He can wear the device and put his clothes over it thus no one will notice it thus making him not to compromise in his confidence. This design is indented to wear around the user's waist and belly thus makes it easy to wear and take off. It can be worn by using the Velcro band provided in the front.

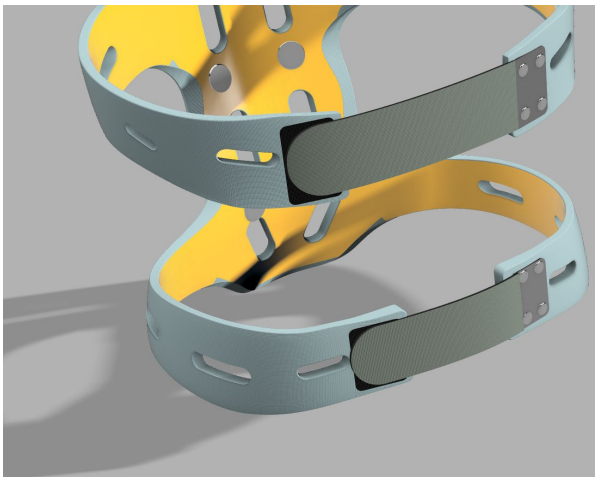


When the Velcro band is tightened by the user during wearing, it also reduces the belly fat projecting out thus increasing the confidence of the user. Thus by using this device the backbone posture can be corrected and also belly fat projecting out can be minimised. The design was made considering a normal human size and body shape. The skeleton sketch inserted was scaled to the required size. This way this design can help the person to maintain a good posture all over the time along with flexibility for the user, thus reducing the lower back pain. The top back pain also comes as a result of bending of the lower back of a person. Thus by avoiding the lower back bending, the top back pain can also be avoided. The design seems to be thick but in actual stitching and making it will be only around 6mm in front and 10mm in back. The design also has a 5V 2A DC charging slot so that the battery can be charged. For minimising the cost further, the device can be made by avoiding the electrical components. Thus it only has the backrest and the outer cover fabric thus avoiding the massaging thus making the device even cheaper.









THANK YOU