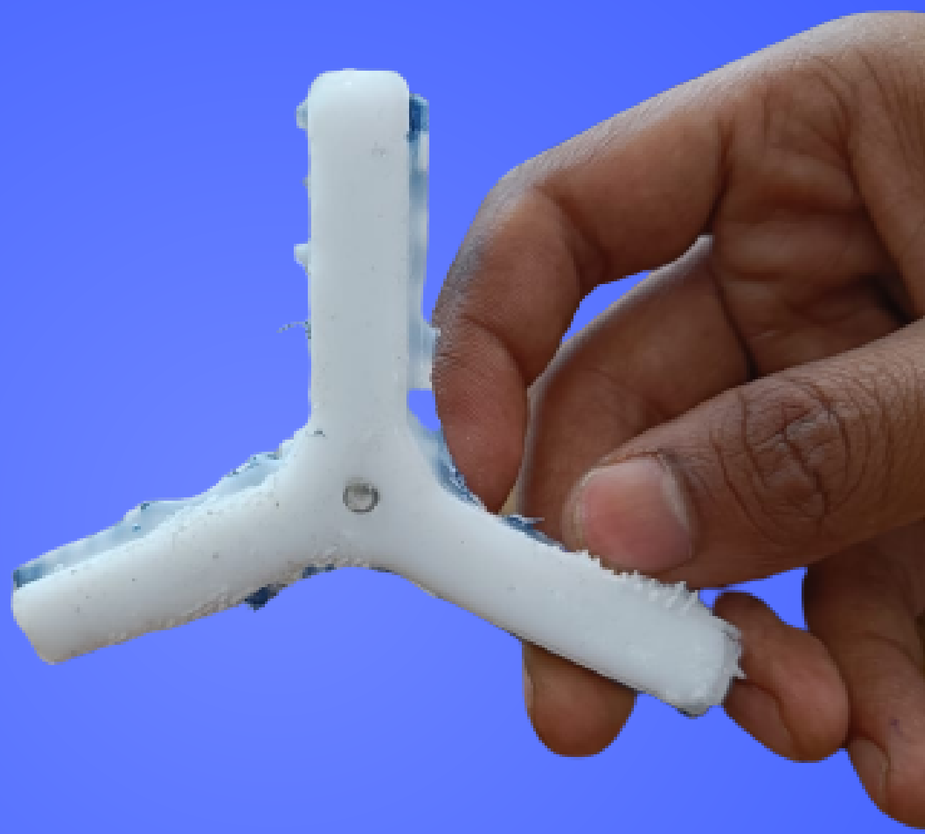
DESIGN LAB-ME205

Soft Robotic Gripper

TUESDAY GROUP C



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Overview

Soft Robotic Gripper consists of inflatable parts that allow the flexibility to be able to grab objects This is useful for people with Diabetic Neuropathy.

Materials Required

1. Liquid Silicone Rubber and Hardener
2. Pipe
3. Compressed air source
4. Arduino Uno
5. LM35 Temperature Sensor

Mold and Process

The Shape of the mold is 3D printed using PLA. The LSR is then mixed with hardener and poured into the mold and is given some time to harden. The temperature sensor is then connected to the arm of the gripper inorder to measure the temperature.

Design and Process

1

2

3

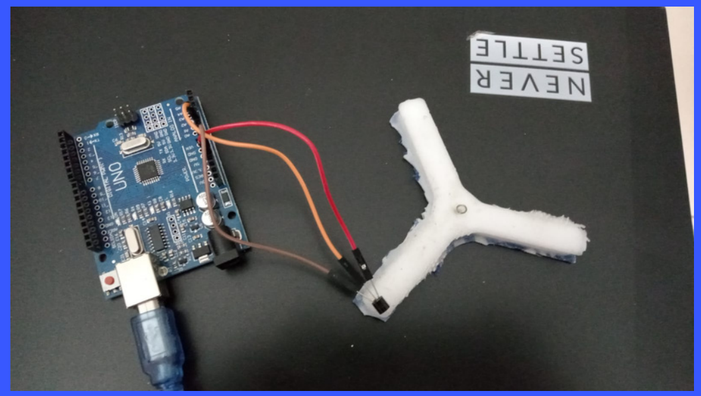
3D Printing of the mold

Printed mold

The hardened silicone mold

3

4



The top layers covered with cloth using LSR

Arduino and temperature sensor connected to the gripper

Working Principle

The working principle of the gripper is Pneumatic Actuation. This involves the use of pressurized air or other gases to inflate or deflate chambers within the gripper, causing it to open or close its fingers. Instead of this we can also use Hydraulic actuation where we use pressurized liquids instead of air. .

We used LSR as the material because of the following reasons :

1. High thermal Stability - It can withstand high temperatures(-50 to 250 C) without deformation.
2. High flexibility which enables it to undergo repeated stretching and compression
3. Its economical

The attempts so far & challenges

The challenges we faced with our soft robotic gripper are:

1. As the thickness of the wall is very small so it easily gets bubble out on applying more pressure (> 2 bar)
2. This prototype cannot hold very heavy objects yet since its thickness is small so a larger sized prototype can help.
3. Some rigid materials like steel should be used inorder to lift very heavy objects.
4. The flexibility and the rigidity of the LSR is lower compared to the Eco-Flex which restricts the bending and inflation of the gripper.(Link)