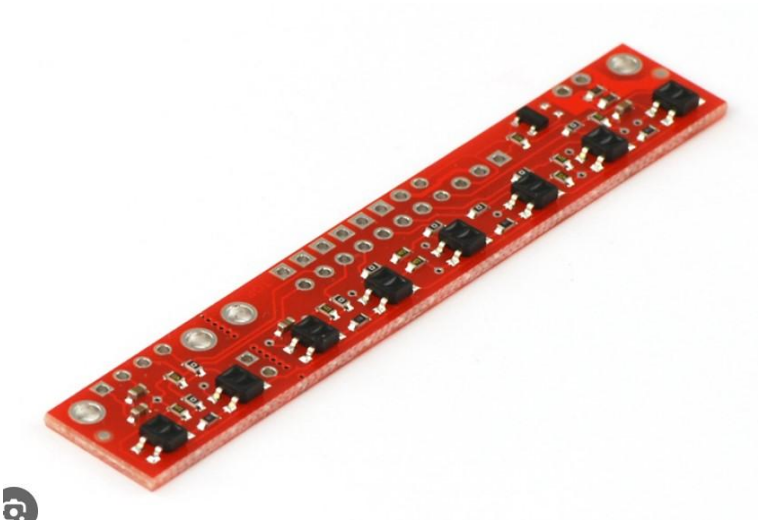
automated ball viscometer assembly

1. List of materials

- Arduino Uno or nano (compatible versions are more cheaps)
- Dupont wires (to connect different electronic parts)
- Protoboard
- USB wire arduino connection (depend of your arduino version)
- 8 Lines follow sensor module (you can buy it in aliexpress or similar)
- glass tube (in my case it had 7,8mm external diameter and 5,2 external diameter
- steel ball (in my case with a ball of 5 mm diameter it was ok)
- 3d printed parts
- Thermometer for liquids (alcohol thermometer its very nice)
- Hot glue gun and silicone bars
- 3M Insertion nuts, 5 mm of length (if you don't have this no problem you can use the hexagonal 3M nuts)
- Male pins (2.54 distance of pins, are the most common to find)
- 3M countersunk bolts, 10mm length (also you can use the common 3M nuts)
- Soldering iron

Some important cautions: Be sure to solder the male pins to the reverse of where the module's sensors are located (in the 8 lines follow sensor module)



caption of 8 Lines follow sensor module

(the pins should point away from where the sensors point)

2. Ensamble

2.1. Cutting the glass tube and cover one of the end with silicone

First you must cut the glass tube. In my case I cut the glass tube with 7,6mm of length. I cut this using a dremel with a cut disk (blade). Then for one side of this glass tube you must cover one end of the glass tube using the hot glue gun (about 5mm of height its ok).

photogra[hy 1 (glass tube with a silicone cover)

2.2. Ensamble 3d parts

All 3d parts (.stl) are in the repository and the Autodesk Inventor files (you should modify this depending on the glass tube's external diameter). The assembly of these parts is very easy. You must insert 3M insertion nuts in the holes using a soldering iron (as I show you in figure 2).

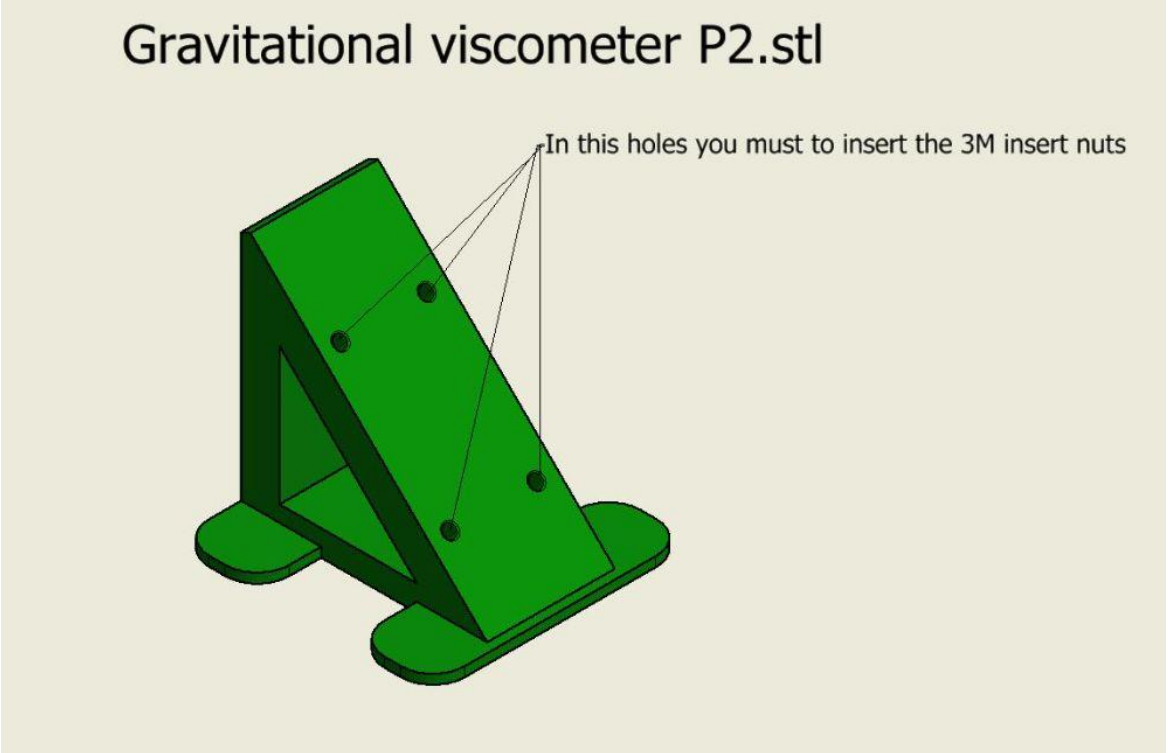


Figure 2.

Then you must insert the 3M insert nuts in “Gravitational viscometer P1.stl” model as I show you in the figure 3.

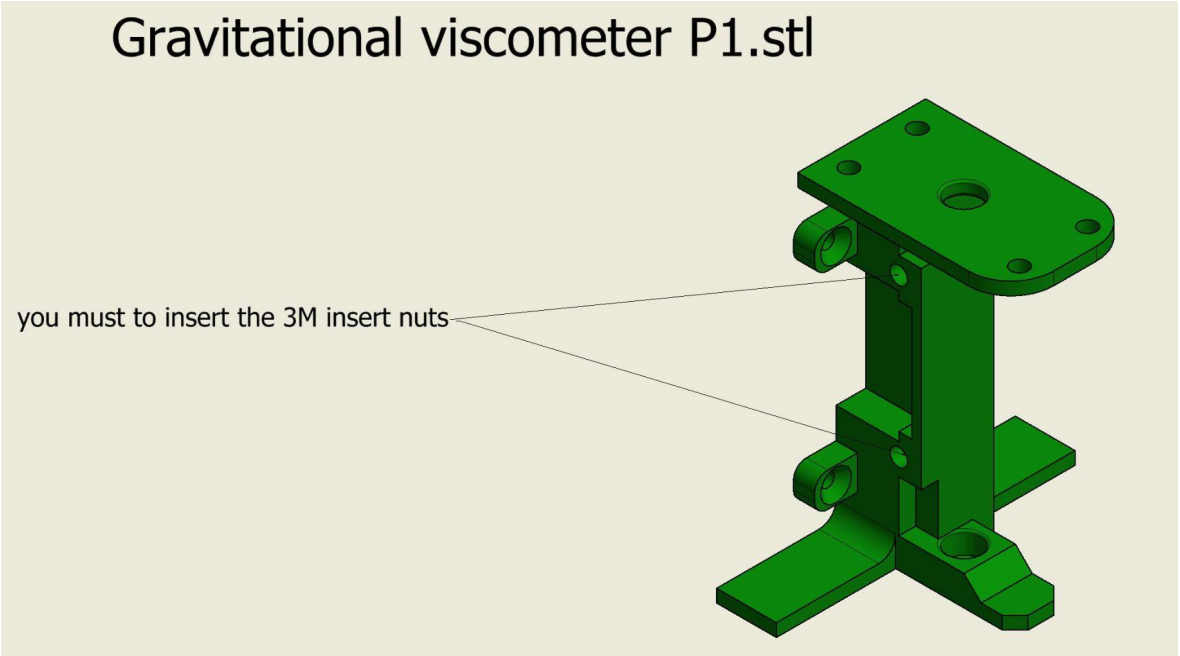


Figura 3.

Now you can assembly this parts using 3M bolts as I show you in the figure 4.

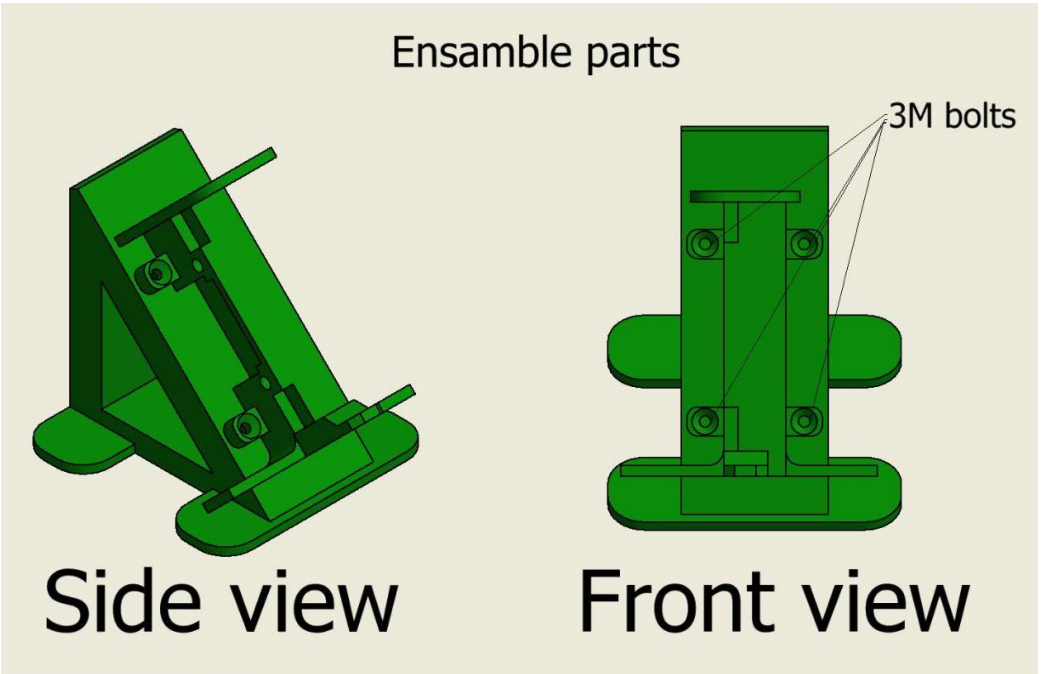
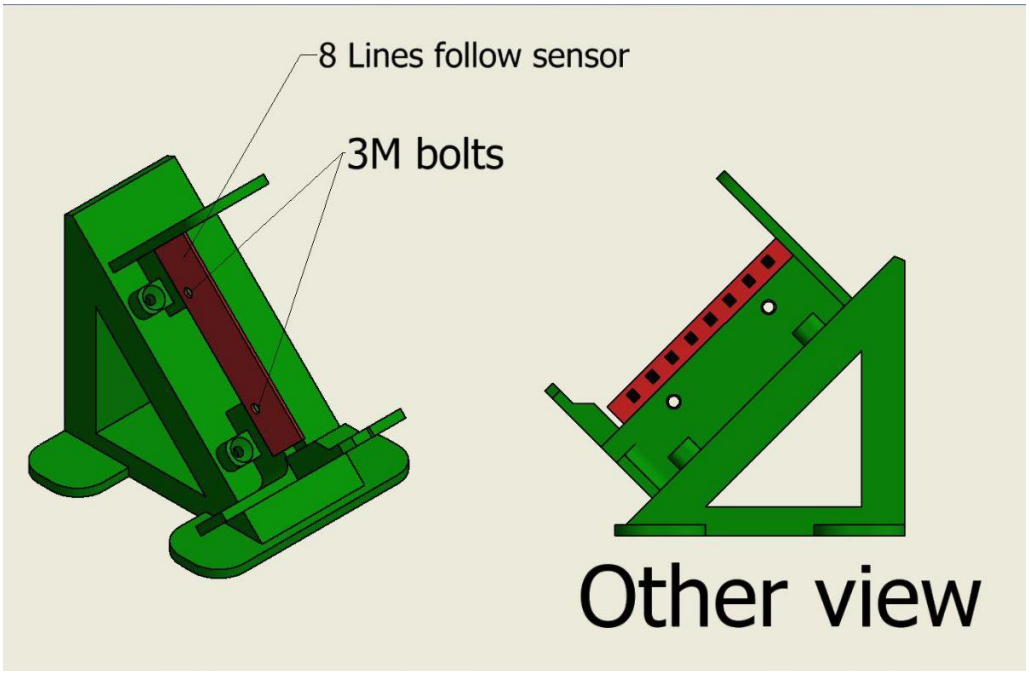


figure 4.

After that you must assembly the 8 lines follow sensor following the next figure (figure 5).



Finally you have this prototype as in the next figure (figure 6)