

**Department of Electronic & Telecommunication
Engineering
University of Moratuwa**

EN2160 - Electronic Design Realization



Test Report

Torque Sensor

Group No. 17

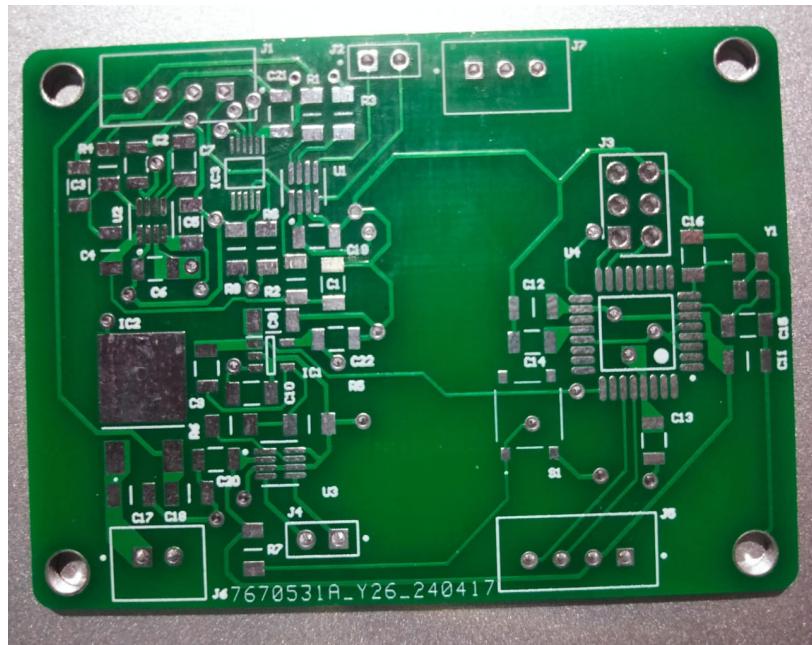
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Date - 2024.06.28

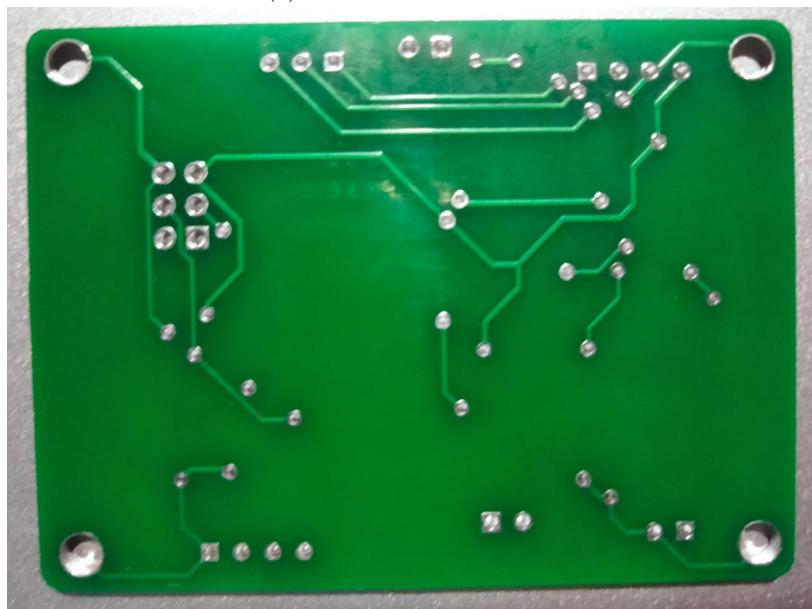
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1 Bare PCB

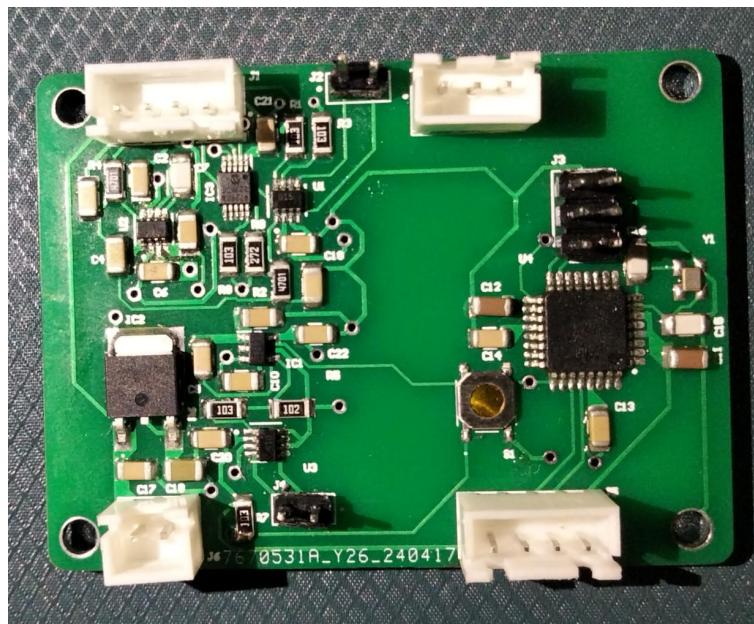


(a) Front view of bare PCB

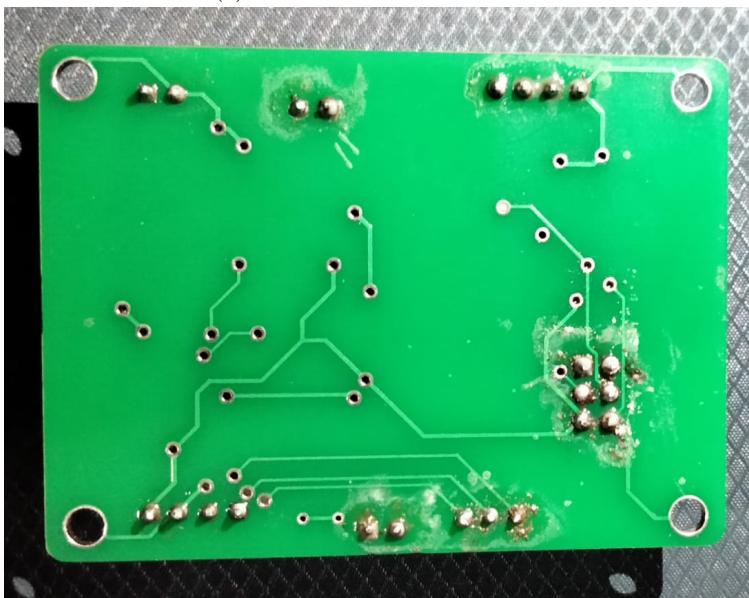


(b) Back view of bare PCB

2 Soldered PCB



(a) Front view of soldered PCB

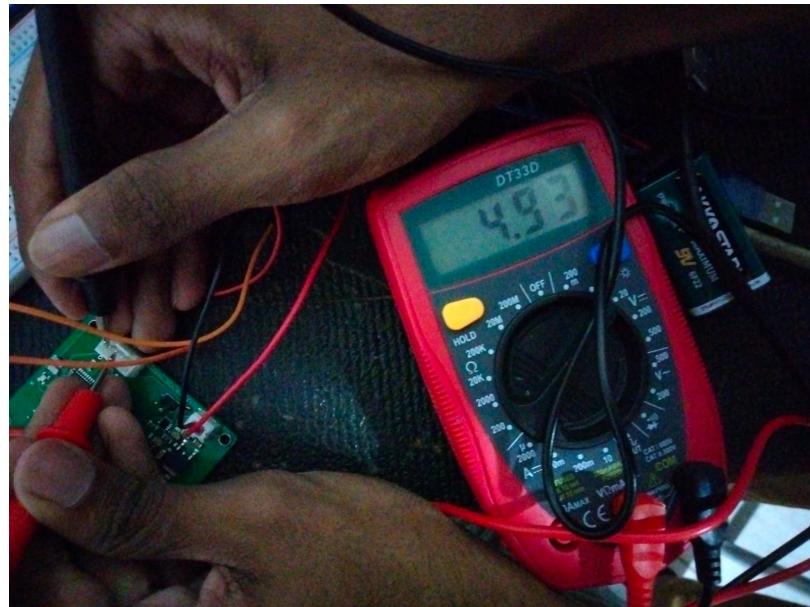


(b) Back view of soldered PCB

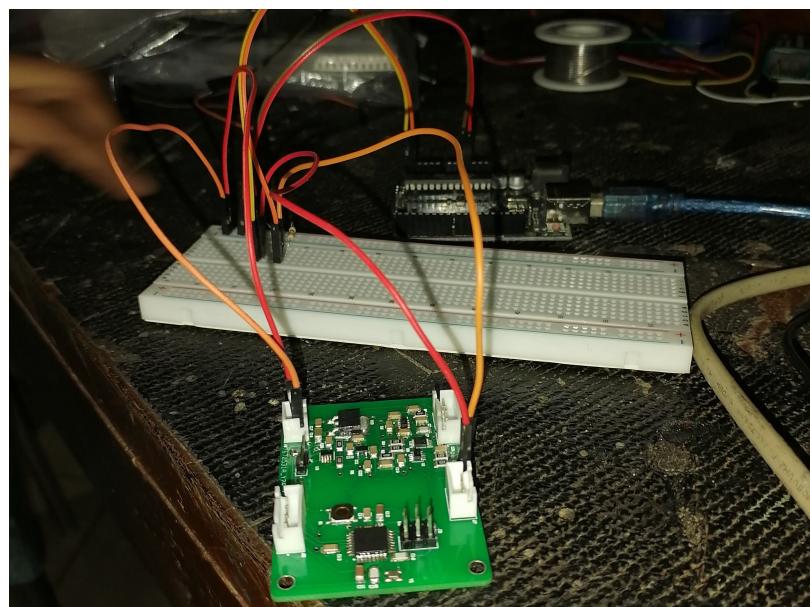
3 Testing

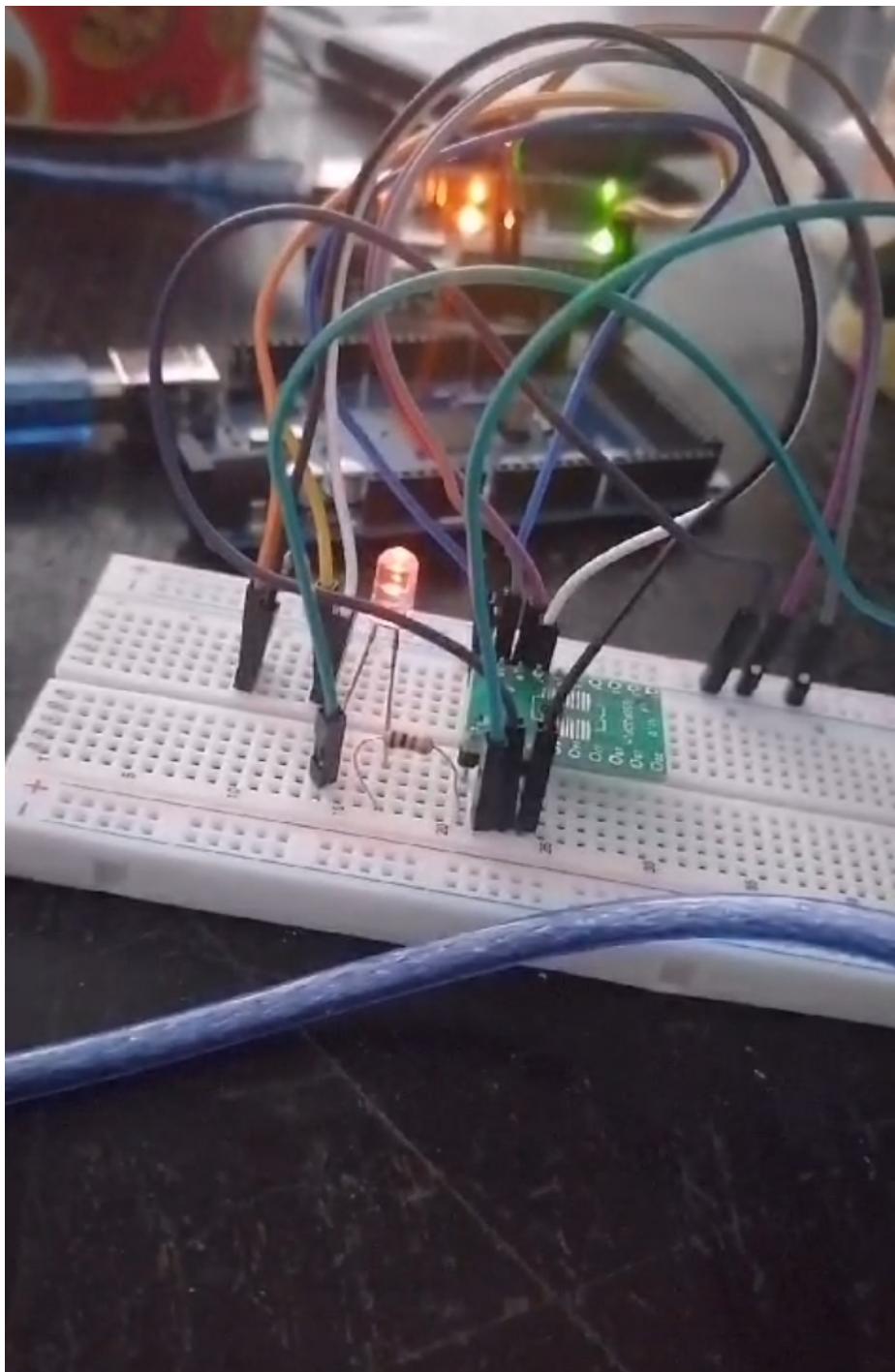
3.1 Testing PCB

3.1.1 Testing Power

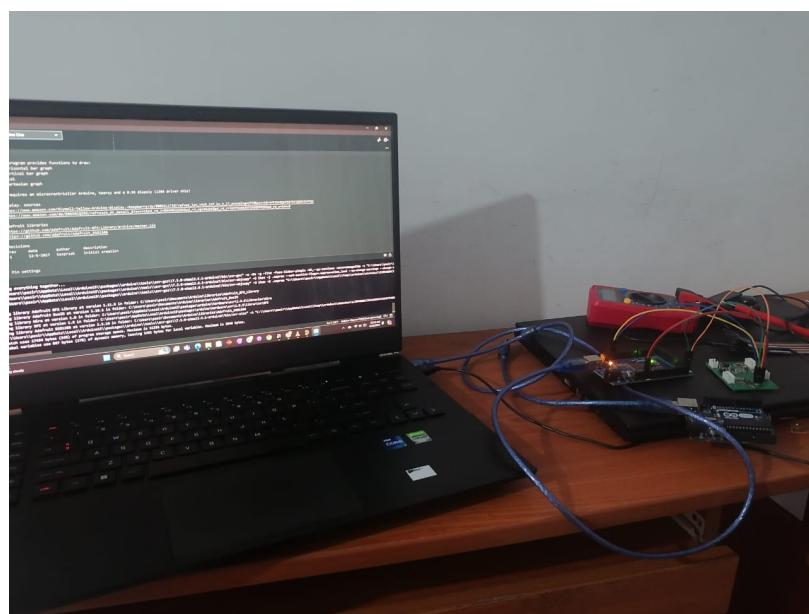


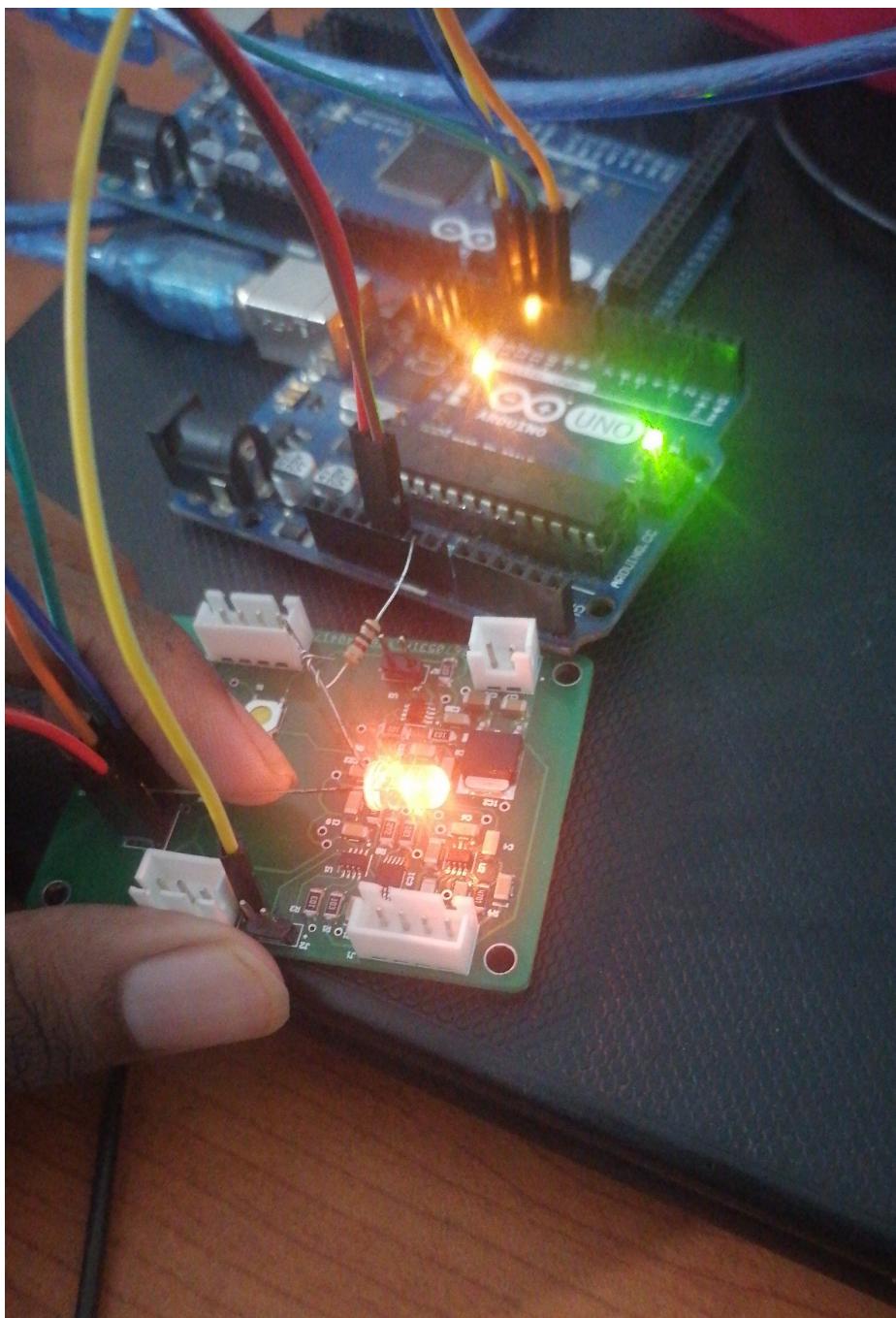
3.1.2 Programming Digital Potentiometers



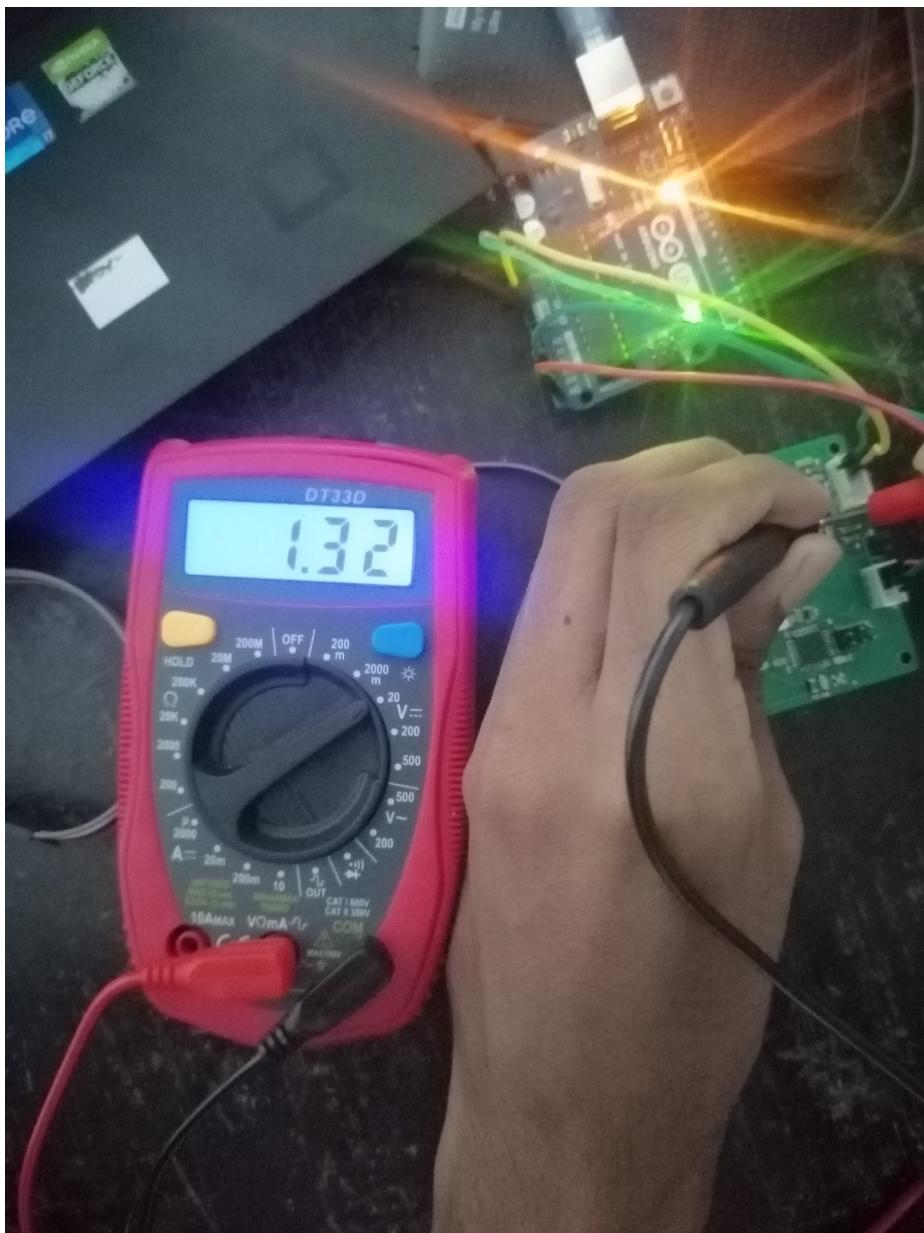


3.1.3 Burning Bootloader and Uploading code to Atmega328





3.1.4 Programming MCP4728 Digital to Analog Converter

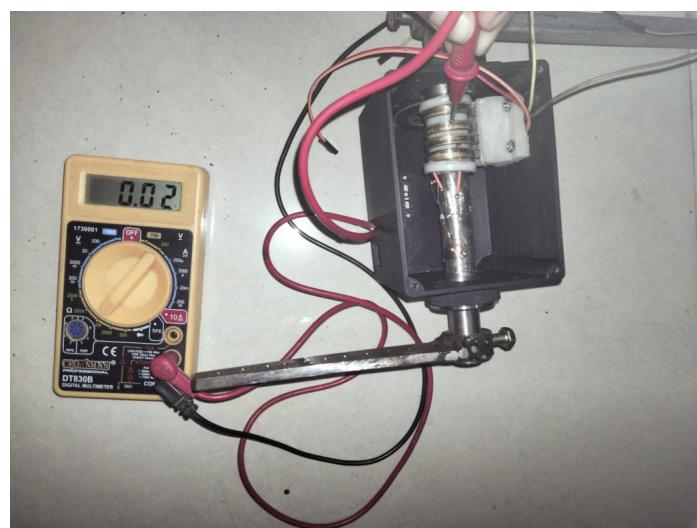


3.2 Testing Mechanical Parts



Figure 4: Set up for testing mechanical parts

3.2.1 Testing slip rings



3.2.2 Testing strain gauges



(a) Resistance of a strain gauge in the no load condition



(b) Resistance of a strain gauge increases with torque

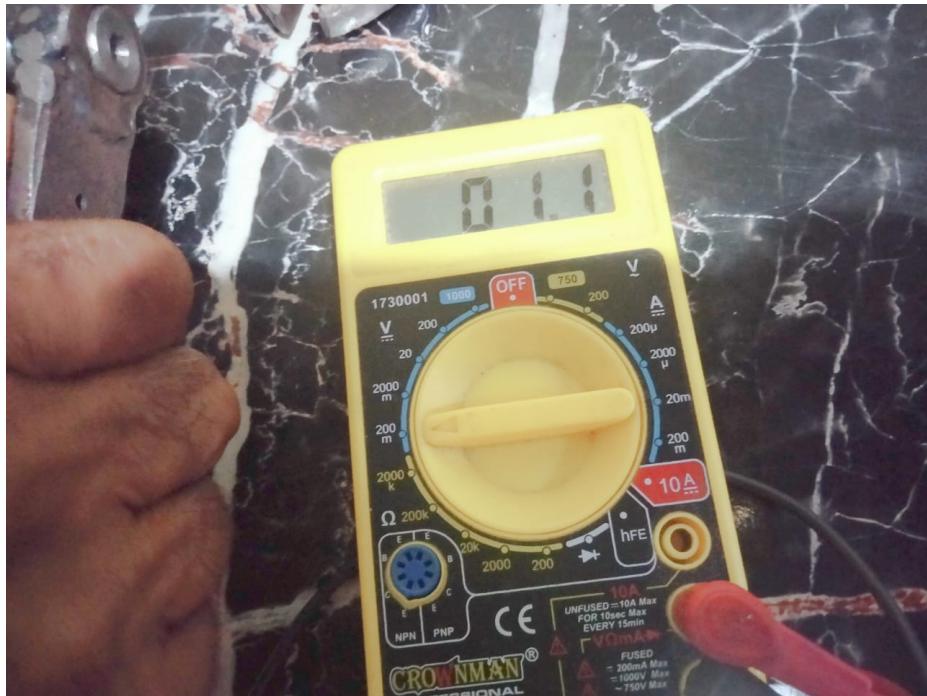
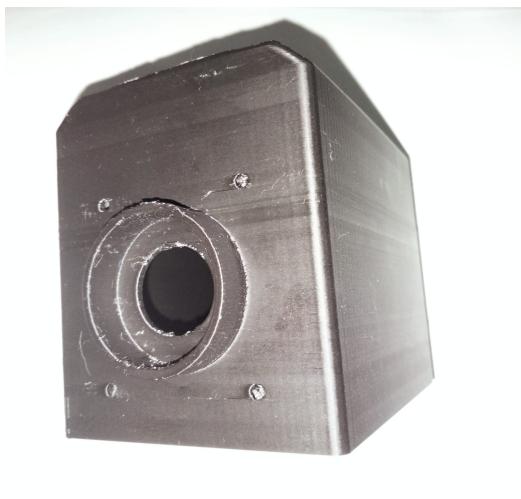


Figure 6: Voltage difference in the strain gauge Wheatstone bridge changes with torque

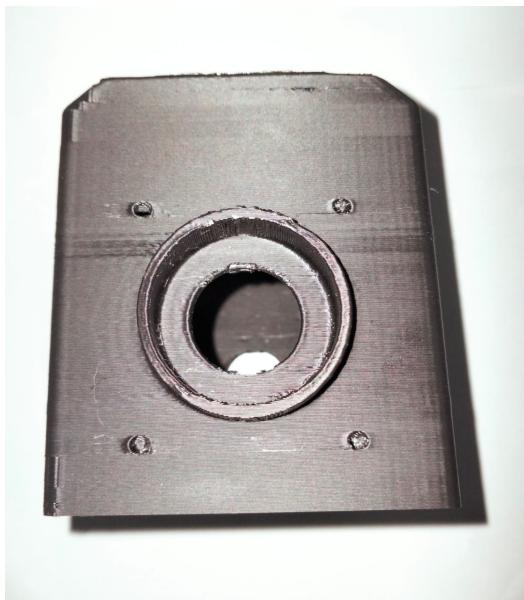
4 Printed Enclosure



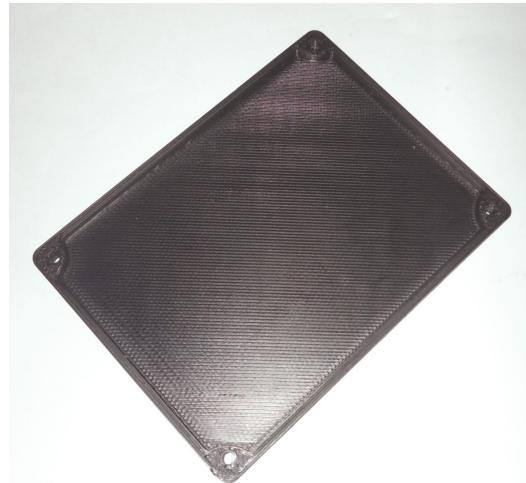
(a) Top Part - Isometric View



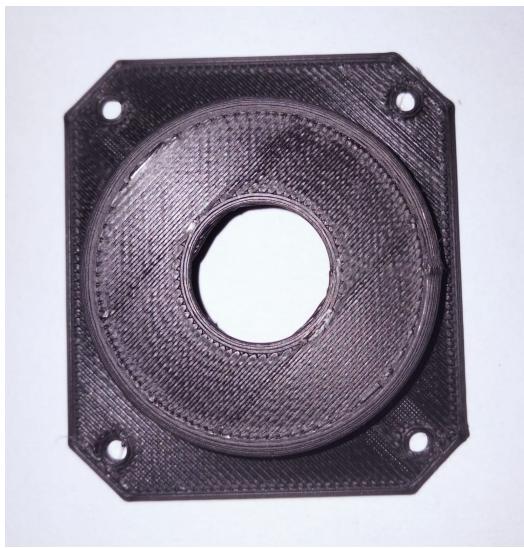
(b) Top Part - Bottom View



(a) Top Part - Front View



(b) Bottom Part

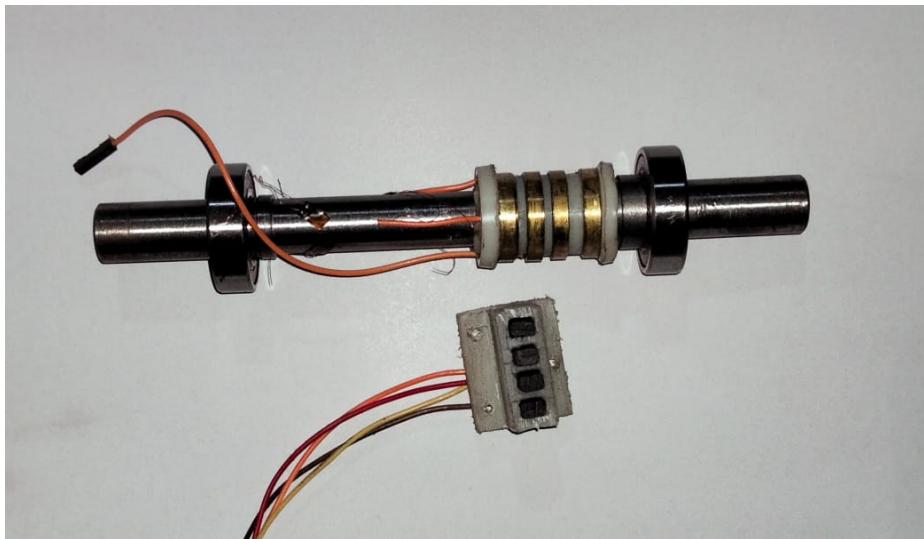


(a) Side Part - Front View



(b) Side Part - Back View

5 Built Mechanical Parts



(a) Designed shaft and slip rings



(b) Integrated shaft and slip rings

6 System Integration



Figure 11: Integrated Torque Sensor